

JOURNAL OF SOUTH AFRICAN
BOTANY

Supplementary Volume No. IV

THE
GENUS AGAPANTHUS
L'HERITER

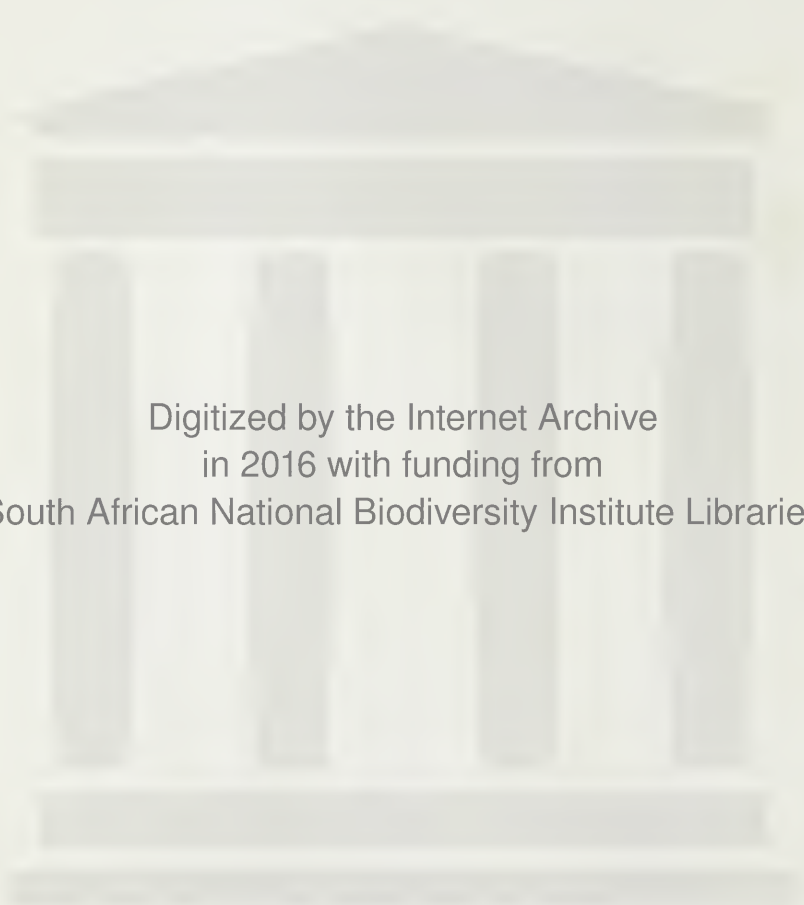
FRANCES M. LEIGHTON

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By courtesy of the Bolus Herbarium, University of Cape Town
PLATE I

Plukenet's Phytographia Pt. III, t. 195, Fig. 1. "Hyacintho affinis, tuberosa radice,
Africana, umbella caerulea inodora"

JOURNAL OF SOUTH AFRICAN BOTANY

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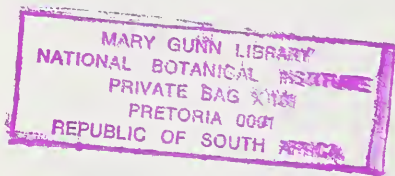
Supplementary Volume No. IV

THE
GENUS AGAPANTHUS
L'HERITIER

FRANCES M. LEIGHTON

(With 14 plates, 3 maps and 21 figure drawings)

January, 1965



DEPARTMENT VAN LANDBOU
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EDITOR'S NOTE

The typescript of this monograph on *Agapanthus* was completed shortly before Mrs. Isaac (Miss Frances Leighton) left South Africa. Due to difficulties in postal communication most of the proof-reading and corrections had to be carried out by members of the Kirstenbosch staff. I must therefore assume responsibility for any errors which were not corrected by the author.

My sincerest appreciation is extended to Dr. G. Joyce Lewis, Botanical Research Officer, for the considerable amount of time and thought she devoted to the checking of the manuscript and proofs. In fact, I consider that her name could justifiably appear as co-editor of this work.

Miss W. F. Barker, Curator of the Compton Herbarium, who was responsible for the preparation of the colour plates, spared no effort in ensuring the accuracy of correlation between illustration and text.

Three sets of galley proofs and one set of page proofs preceded final publication. All these were painstakingly read and checked by Mrs. C. E. Hugo who was also responsible for dealing with the protracted negotiations with the printers.

To each of these ladies I am indeed grateful.

Further thanks are due to the University of Cape Town for financing this publication from funds of the Fourcade Bequest.

H. B. Rycroft.

THE GENUS AGAPANTHUS L'HERITIER

INTRODUCTION

The genus *Agapanthus*, established by L'Heritier in 1788, was placed in Liliaceae Tribus Allieae by Bentham and Hooker and this position was generally accepted until Hutchinson in his Families of Flowering Plants Monocotyledons (1934) removed from Liliaceae Agapantheae, which he separated from Allieae and Gilliesieae, and placed them in Amaryllidaceae. Hutchinson considers the umbellate inflorescence to be of greater taxonomic importance than the superior ovary in distinguishing the families Liliaceae and Amaryllidaceae. I adhere to the older classification. The name *Agapanthus* is derived from the Greek *agape*—love and *anthos*—flower.

The earliest reference to these plants in literature, as far as I am aware, is in Breynius' *Prodromus Fasciculi Rariorum Plantarum* 1679 where it is described as follows—"Hyacinthus Africanus tuberosus, flore caeruleo umbellato. This African Hyacinth which in the month of September last year flowered in the garden of the most illustrious and honourable Lord Hieronymus Bevernink, is a remarkable wonder among the rare plants of Europe, crowned with flowers each of which is singularly beautiful . . .". The pictures to illustrate this work were not published until 1739 when a very good representation of *A. africanus* (L.) Hoffm. appeared.

The African Hyacinth with tuberous roots next appears in Hermann's *Catalogue of the Leyden Botanic Gardens* (1687).

Leonard Plukenet figures *Agapanthus africanus* in his *Phytographia* published in 1692, and states that it had flowered in the Royal Garden at Hampton Court and that it had been most elegantly depicted in the *Codex Bentinianus*.

In 1753 Heister, in his treatise on *Brunsvigia*, attached the name *Tulbaghia* to "*hyacinthus africanus tuberosus*" etc. but this name has been rejected (*Int. Bot. Congr.* 1950) and the name *Agapanthus* conserved.

Commelyn in 1701, in *Hortus Amstelodamensis*, states that he was given a plant by the Hon. Mr. Gerbrand Pancras, president of ships and curator of the medical garden. This plant flowered and fruited in 1698 and the figure shows a very luxuriant form of *A. africanus*.

Seba in his *Thesaurus* in 1743 depicts *A. africanus*. Up to the publication of *Species Plantarum* in 1753 the name *Hyacinthus* was used. In this work Linnaeus called the "African Hyacinth" *Crinum africanum*.

Linnaeus seems to have been in some doubt about placing the genus for, in his *Viridarium Cliffortianum* (1737) and his *Hortus Cliffortianus* (1737), he referred to the same plant as *Polianthes floribus umbellatis*. The name *Polyanthes*

was retained by Miller in the illustrations to his Gardeners Dictionary published in 1760, although he was aware of the change made by Linnaeus and used *Crinum africanum* in the eighth edition of his Dictionary (1768).

When L'Heritier established the genus *Agapanthus* he did not retain Linnaeus' specific epithet, viz *africanus*, but applied the name *A. umbellatus*. This mistake was rectified by Hoffmansegg in 1824.

Up to the time the genus was established (1788) it seems almost certain that only one species of *Agapanthus* had been introduced to Europe.

The first expedition to the Eastern parts of the country, which might have found a second species of *Agapanthus*, was that of Schrywer in 1689. This route lay somewhat north of where *Agapanthus* occurs to-day except perhaps in the Longkloof.

In 1702, during the Governorship of Willem Adriaan van der Stel, a party of explorers travelled as far east as the Fish River. This party would certainly have passed through the regions where *A. praecox* grows. The next possible collector was Beutler on his expedition which reached the Kei River in 1752.

Between 1772 and 1775 Thunberg, Masson and Sparrman journeyed to the eastern parts of South Africa and in all probability found other *Agapanthus* species as well as *A. africanus* which is confined to the South Western Cape. Thunberg published a description of *Mauhlia linearis* under which he listed *Agapanthus umbellatus* as a synonym. Of the two sheets in Thunberg's herbarium at Uppsala labelled *M. linearis*, one is *A. africanus* and the other is almost certainly a form of *A. praecox* Willd. *Mauhlia latifolia* of Thunberg might be a poor specimen of *A. praecox* Willd. — most of the flowers have fallen off the pedicels and those which remain look as though they had opened after the specimen was gathered. The name *Mauhlia latifolia* Thunberg appeared in Appendix XXII (1814) of the Uppsala Museum but there was no description of the plant.

In the text accompanying a plate of *A. africanus* drawn in 1800, and produced in Curtis' Botanical Magazine, it is stated that nurserymen make two varieties of *Agapanthus*, a major and a minor. As there is a big range in size within the species this might mean that they distinguished large and small forms of *A. africanus* or it might be that one of the larger species had arrived in European gardens.

In 1813 Redoute in his Liliacees figures a species other than *A. africanus*. This appears to be a poor representation of one form of *A. praecox* Willd. Savi, in his Flora Italiana in 1822, shows a plant of the *A. praecox* complex.

In Paxton's Botanical Dictionary (1868) we find three species and four forms of garden origin. The species are *A. minor*, *A. praecox* and *A. umbellatus* which he distinguishes chiefly on the height of the inflorescence. Even from the meagre information given, one may surmise that he refers to *A. africanus* and two forms of *A. praecox*.

When the *Flora Capensis*, Vol. VI, appeared in 1896-97, J. G. Baker listed only *A. umbellatus* L'Herit. under which he placed 4 varieties viz:—

"Var. *A. multiflorus* Willd. Enum. 353 in nota; a more robust variety with more numerous flowers (60—80) and broader leaves. Kunth, Enum. IV. 480."

"Var. *A. praecox* Willd. an early flowering form (at the end of June in English gardens) with narrower leaves, a shorter peduncle, and narrower perianth segments. Kunth, Enum. IV. 480. *A. umbellatus* var. *minimus* Lindl. Bot. Reg. t. 699." This is quite wrong, for *A. praecox* Willd. both from his description and his specimen, is a large flowered form.

"Var. *A. minor* (Lodd. Bot. Cab. t. 42)," This is quite clearly *A. africanus* (L.) Hoffmegg.

"Var. *leichtlinii* Baker." This seems to be a more robust form of *A. africanus* (L.) Hoffmegg.

He cites specimens from Natal, Orange Free State and the Eastern Cape which belong to widely different species.

By 1884 Nicholson lists nine varieties of *Agapanthus umbellatus* in his *Gardeners Dictionary*. *A. umbellatus* var. *leichtlinii* refers, I think, to a form of *A. africanus*; var. *maximus* is probably *A. praecox*; var. *minor* is a form of *A. africanus*. Then comes the first reference to *A. campanulatus*—this he calls *A. umbellatus* var. *mooreanus*. He gives the date of introduction as 1879. This plant was originally sent from South Africa to Sir Frederick Moore by a young German who had been a student at Glasnevin and was named "*Mooreanus*" by the student in honour of Sir Frederick. Lady Moore is almost certain that this student sent the plants from the Orange Free State which helps to strengthen the case for their being *A. campanulatus* subsp. *patens*. However, in the course of time, the name has been applied to a bewildering number of hybrids of horticultural origin of which *A. campanulatus* is a component. (Hon. Lewis Palmer Journ. R. H. LXXIX pt. Jan. 1954 and in a letter). The other varieties he names are clearly of garden origin.

In Bailey's *Standard Cyclopedia of Horticulture* (1914) a large number of varieties are listed and although there is much confusion and invalidly published names are attached to plants, it is clear that *A. inapertus*, *A. campanulatus*, *A. praecox* subsp. *minimus* and *A. caulescens* are well established in horticultural circles.

A. caulescens was first described and figured by Sprenger in *Gartenflora* in 1901. He records that seed was sent to him by his friend Dietrich from the high mountains of the Transvaal. There was apparently a chemist in Zeerust, in the early years of this century, by the name of Dietrich who was something of a naturalist. It has now been established that *A. caulescens* grows in Northern Natal and Swaziland. The plants in the wild state differ slightly from those in Glasnevin and Kew which are regarded as descendants of Sprenger's plants. The wild forms have the deep blue flowers which Sprenger describes, whereas

the garden forms of the present day are paler, at least when grown in England. A plant from Kew grown in the open at the National Botanic Gardens showed almost as deep a colour as those from Swaziland.

In the Journ. Royal Hort. Soc. XXXIX, 363 (1913) A. Worsley gives an account of the genus *Agapanthus*. He equates *A. weilligii* (or *weillighii*) with *A. inapertus* Beauv. Since he was writing at the time when these were both fairly recent introductions, there was little chance that hybrids had been raised. He acquired *A. weillighii* from C. G. van Tubergen of Haarlem and says that it was originally sent out by M. Max Leichtlin of Baden-Baden about 1898. *A. inapertus* was sent by M. H. Junod to Beauverd in 1903 and described by him in 1910 in the Bulletin Soc. Bot. Geneve 2 Ser., Vol. II, p. 194. Thus *weillighii* was the first name given to this type of *Agapanthus* but it was never validly published.

In 1920 Dr. H. M. L. Bolus published *A. pendulus*, now regarded as a form of *A. inapertus*, and *A. walshii* from the mountains of the South Western Cape. This has since been collected only once (*Linley* SAM 58398).

When the Royal Horticultural Society's Dictionary of Gardening was published in 1951, nine species of *Agapanthus* were listed. Under *A. orientalis* are placed a number of garden varieties some of which should rightly be placed under other species, e.g. *A. maximus* is very probably *A. praecox*.

Research since this date has necessitated a number of changes some of which were made by the Hon. Lewis Palmer in the R.H.S. Journal, Vol. LXXIX, pt. I, Jan. 1954.

At this stage it may be of help to horticulturists, and of interest to botanists, to enumerate all the names of *Agapanthus* species and forms which have appeared and to attempt to equate them with the species which are now recognised.

<i>A. umbellatus</i>	..	..	..	<i>A. africanus</i> (L.) Hoffm.
1788—				Later to include all the known species.
var. <i>maximus</i>	..	..		<i>A. praecox</i> Willd.
var. <i>minimus</i>	..	..		<i>A. praecox</i> Willd. subsp. <i>minimus</i>
var. <i>globosus</i>	..	..		<i>A. campanulatus</i>
var. <i>insignis</i>	..	..	..	<i>A. caulescens</i> Spreng.
var. <i>flore pleno</i>	..	..	..	<i>A. praecox</i> Willd. (double flowered)
var. <i>albiflorus</i> (Paxton 1868)				<i>A. praecox</i> Willd. (white form)
var. <i>albidus</i> (Bailey)	..			<i>A. campanulatus</i> Leighton (white form)
var. <i>multiflorus</i>	..	..		<i>A. praecox</i> Willd.
var. <i>giganteus</i>	..	..		<i>A. praecox</i> Willd.
var. <i>mooreanus</i>	..	..		<i>A. campanulatus</i> Leighton
var. <i>leichtlinii</i>	..	..		<i>A. africanus</i> (L.) Hoffm. form

var. <i>weillighii</i>	.. ..	<i>A. inapertus</i> Beauv.
var. <i>atrocaeruleus</i>	.. ..	<i>A. inapertus</i>
var. <i>minor</i> (Bailey)	.. ..	<i>A. campanulatus</i> Leighton
var. <i>pallidus</i>	.. ..	<i>A. praecox</i> Willd. subsp. <i>minimus</i>
var. <i>praecox</i> (Bailey)	.. ..	<i>A. praecox</i> Willd. subsp. <i>praecox</i>
var. <i>caulescens</i>	.. ..	<i>A. caulescens</i> Spreng.
var. <i>saundersonianus</i>	.. ..	Insufficient data to hazard a suggestion.
var. <i>variegatus</i>	}	Species with variegated leaves.
var. <i>aureus</i>		
var. <i>aurivittatus</i>		
<i>A. minor</i> Lodd. (1817)	.. ..	<i>A. africanus</i> (L.) Hoffm.
<i>A. multiflorus</i> Willd. (1809)	.. ..	nomen nudum (no plant preserved)
<i>A. praecox</i>	.. ..	
<i>A. insignis</i> Bull. (1906)	.. ..	<i>A. caulescens</i> Spreng.
<i>A. maximus</i> Hort. (1867)	.. ..	<i>A. praecox</i> Willd.
<i>A. inapertus</i> Beauv. (1910)	.. ..	
<i>A. hollandii</i> Leighton (1934)	.. ..	<i>A. inapertus</i> Beauv. subsp. <i>hollandii</i>
<i>A. gracilis</i> Leighton (1945)	.. ..	
<i>A. campanulatus</i> Leighton (1934)		
<i>A. longispathus</i>	(1934)	<i>A. praecox</i> Willd. subsp. <i>longispathus</i>
<i>A. patens</i>	(1945)	<i>A. campanulatus</i> Leighton subsp. <i>patens</i>
<i>A. pendulus</i> L. Bol. (1923)	.. ..	<i>A. inapertus</i> Beauv. subsp. <i>pendulus</i>
<i>A. weillighii</i> Hort. (1913)	.. ..	" " "
<i>A. walshii</i> L. Bol. (1920)	.. ..	

These names have been obtained from—

Paxton's Botanical Dictionary.

Nicholson's Dictionary of Gardening.

Bailey's Cyclopædia of Horticulture (1914).

R.H.S. Dictionary of Gardening.

In most cases the information is so meagre that it is only possible to make a suggestion, and the above list must be regarded as tentative.

In 1932 and 1933 my attention was first drawn to *Agapanthus* growing in the National Botanic Gardens at Kirstenbosch. At that time only *A. africanus* (L.) Hoffm. (which included all the known open flowered forms), *A. inapertus*, *A. pendulus* and *A. walshii* were recognised—other species such as *A. caulescens* had been described in Europe but they had not been re-discovered in South Africa.

It was not until 1953 that I was able, with the help of the Smuts Memorial Fellowship, to study the genus intensively. When I set about collecting plants of *Agapanthus* from all those parts of South Africa where they occur naturally, I discovered a number of facts which had previously not been evident.

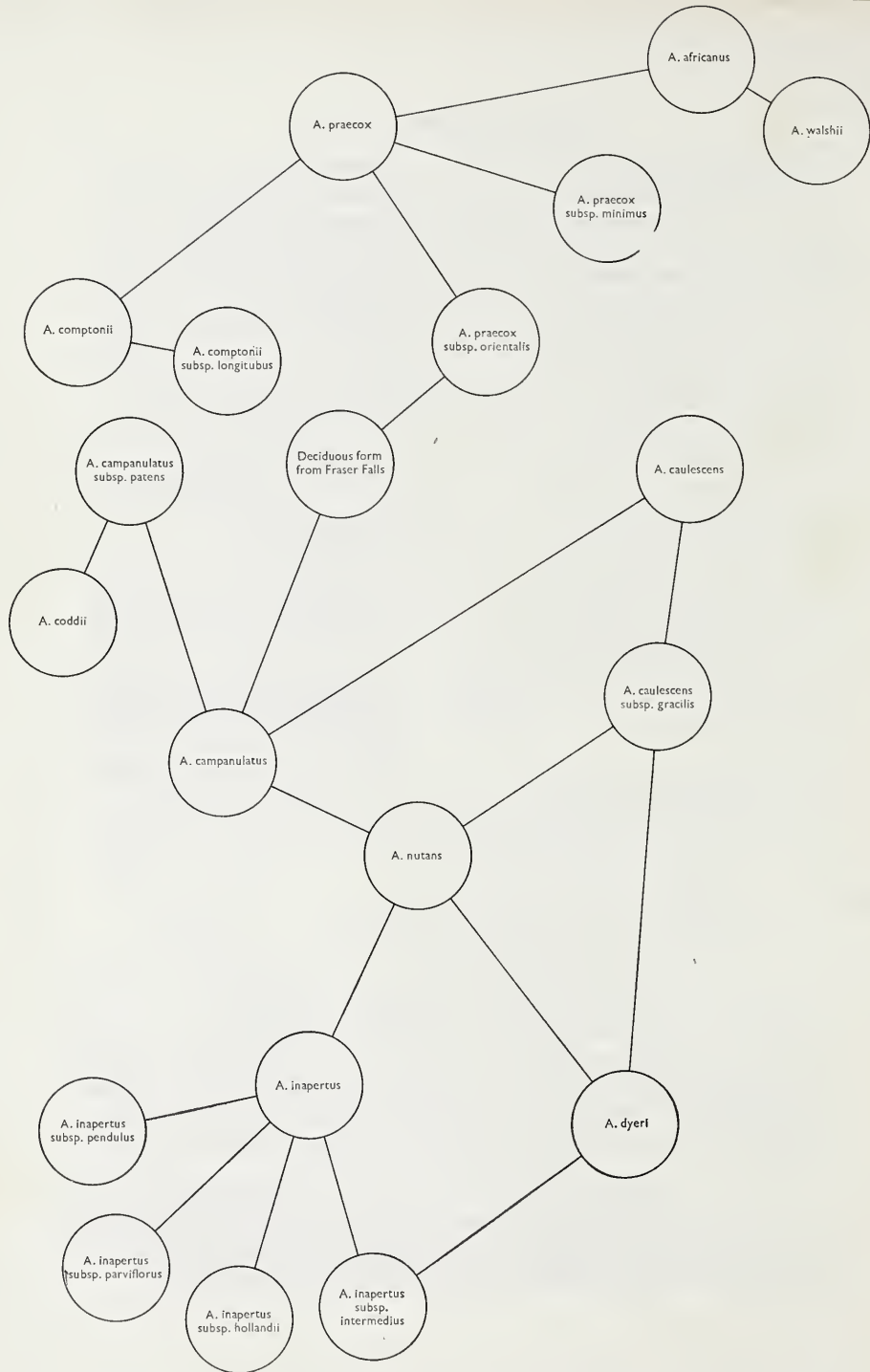


FIG. 1. DIAGRAM TO ILLUSTRATE THE RELATIONSHIPS OF THE SPECIES AND SUBSPECIES OF AGAPANTHUS. Taking the open flowered form as the most primitive the chain of species can be traced from *A. campanulatus* subsp. *patens* through to *A. inapertus* along one line of development and to *A. africanus* and *A. walshii* or *comptonii* on the other.

Agapanthus had a much wider range of distribution than had been apparent from the relatively small collection of plants in the National Botanic Gardens, and these plants were not representative of those in the wild state. They were probably selected by the donors because they differed from the group in which they grew—the largest flowers or the deepest colour.

It soon became clear that what I had believed to be a relatively small genus was either a genus with many species differing only slightly from each other or a genus with a few species with a vast range of variation.

In the course of eight years I have assembled about 250 different collections of living specimens at the National Botanic Gardens, some I have collected myself but most of them have been sent by botanists, both amateur and professional, from many parts of the Republic of South Africa.

They are easy to grow and remain constant in character except for variation in size—in some cases they increase in size in cultivation, in others, even under very favourable conditions, they remain the same as when they were collected.

MORPHOLOGY

There are two extreme types of floral morphology in the genus *Agapanthus*. At one end of the scale we have the open flowered forms with a short tube and widely spreading perianth segments; at the other end are those with long tubes and segments cohering or spreading only slightly. In the case of the former, the pedicels are erect or spreading and in the latter they are cernuous or pendent. Between these widely divergent forms there is a wide range of intermediates.

Herbarium material is often very misleading. If the flowers are not killed and pressed almost immediately after being picked, the perianth tube may appear relatively longer—that is, the free part of the perianth shrivels and shrinks more quickly than the tube. Also, flowers which open after the specimens have been gathered have different proportions, usually the tube is longer in relation to the free parts. I have endeavoured to take my measurements from living flowers at the stage when the anthers dehisce, when I have, as far as possible, mounted flowers on gummed cards to keep them extended to their full size. For this reason I find it very difficult to assign names to dried specimens. There is a great deal of variation in leaf shape and texture and in the character of the leaf margins—some are heavily ridged, others hyaline. The fruits, too, are very variable although there is a general resemblance in most plants which constitute a species. (See figs.)

Another morphological distinction which cuts right across the whole gamut of floral types is the feature of evergreen or deciduous leaves. The evergreen species of *Agapanthus* shed a few of their outer and therefore older leaves, each year, and produce about the same number of new ones from the apex of

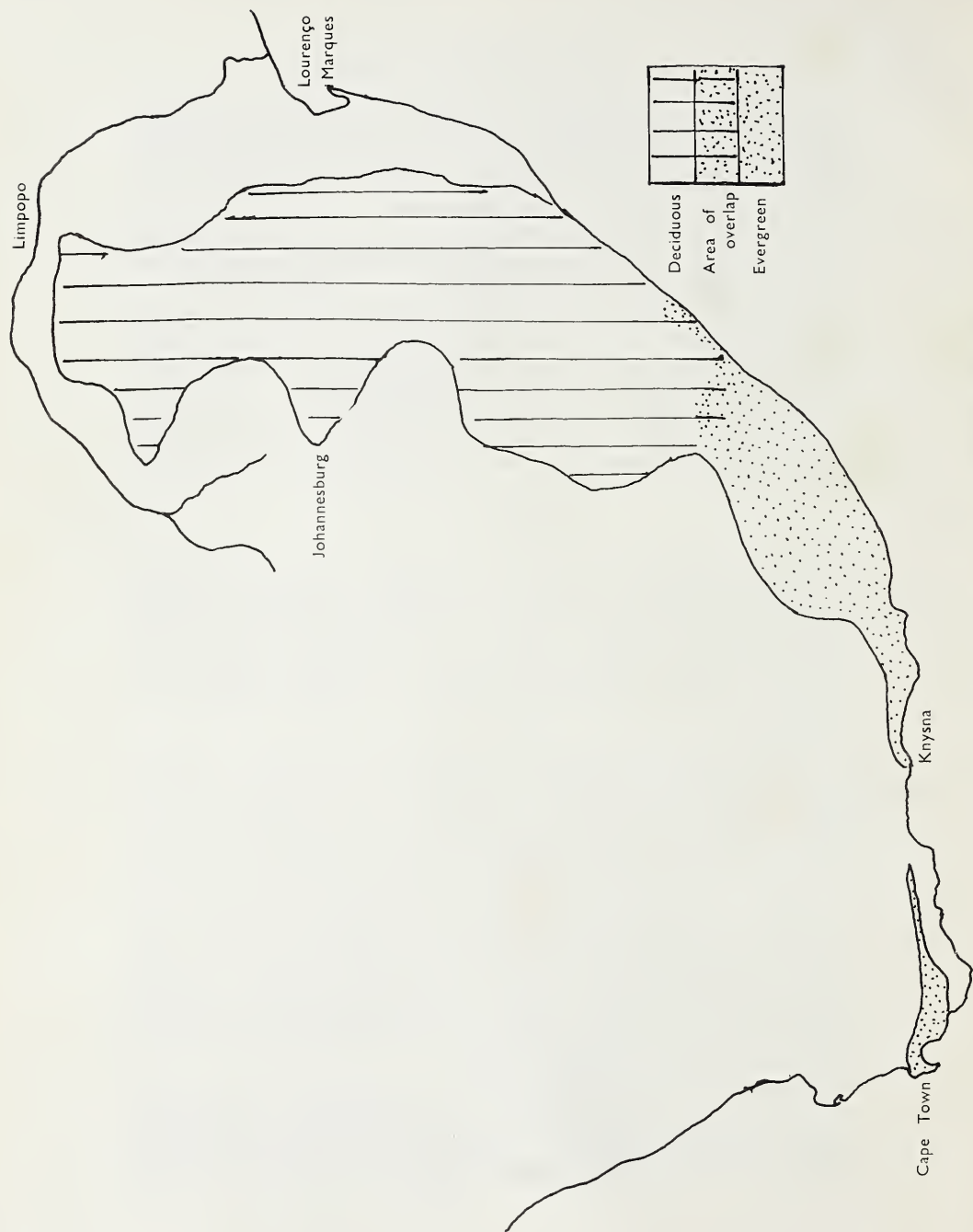


FIG. 2. MAP SHOWING DISTRIBUTION OF DECIDUOUS AND EVERGREEN SPECIES.

the growing shoot. The deciduous species lose all their leaves in the autumn and after lying dormant for a month or two, produce an entirely new set in the spring. From the centre of this shoot in both cases, the inflorescence appears. This leaf character remains constant in a given species no matter under what climatic conditions the plants are subsequently grown. In evergreen species grown where frost occurs the leaves are killed and grow afresh in the spring.

The species which occur in the South Western Cape (Winter rainfall area) are evergreen as are those in the southern part of South Africa where the rainfall is distributed more evenly throughout the year. The area between Humansdorp and Port St. Johns on the coast and Cathcart and Cradock inland, although subjected to summer rains, is also one where the species and forms are almost entirely evergreen. At Fraser Falls just north-east of Port St. Johns, a form is found which, unlike the other deciduous forms, drops all its leaves and immediately replaces them without the dormant interval which characterizes the other species.

Further north and east of Port St. Johns the evergreen give way to the deciduous species and it is doubtful whether any evergreen species occur naturally north of the Umzimkulu River.

The most southerly record of a deciduous species is that of *A. campanulatus* in the vicinity of Umtata and Idutywa.

It is of interest to note that in other genera of South African Monocotyledonous plants where there are both evergreen and deciduous species, the position is reversed. The deciduous ones grow in the winter rainfall area and are dormant in summer and the evergreen ones grow in the summer rainfall area, e.g. *Haemanthus*, *Brunsvigia*, *Ornithogalum* and *Albuca*.

The evergreen species, with the exception of *A. walshii* (q.v.), are all of the open-flowered type whereas those with the deciduous habit include floral forms ranging from the most extreme of the open-flowered type, *A. campanulatus* subsp. *patens*, to the narrow-flowered, long tubed *A. inapertus*.

DISTRIBUTION

The genus *Agapanthus* occurs from the Cape Peninsula to the mountain ranges just south of the Limpopo River. The range of altitude for the genus is from sea level to 7,000 ft. (Thaba Putsoa). Even within a species this range may be quite appreciable, for instance, *A. africanus* flourishes on the upper slopes of Table Mountain and at sea level on the coast east of the Cape Peninsula. *A. praecox* too has a range of tolerance from sea level to about 4,000 ft., but in general most species occur only at higher or at lower altitudes. They are found only in areas where the rainfall is more than 20 inches per annum.

If we regard the open-flowered type as the more primitive form of flower, *Agapanthus* might be regarded as having arisen in the southern part of Africa



FIG 3. MAP SHOWING DISTRIBUTION OF AGAPANTHUS IN RELATION TO ALTITUDE AND RAINFALL.

and spread northwards. It seems feasible to suggest that the centre of distribution might have been in the region from Humansdorp to the Kei River on the coast, and inland to Cradock and Cathcart where a multiplicity of forms still exists.

It would appear, if this supposition is correct, that the main line of advance was in a north-easterly direction following the coast in Natal along the eastern side of the Drakensberg to Swaziland and the Transvaal. Another tongue spread westwards to Knysna and thence to the south-western extremity of the country. Yet another stream diverged in the Transkei and East Griqualand region to go through Basutoland and the country abutting immediately on it to the east and north. This form, somewhat modified, appears again in the Transvaal near Heidelberg and without any intermediate records in the Kransberg at the western end of the Waterberg.

The form which first appears in the region of Umtata, and which predominates in Natal, is *A. campanulatus*. Although it is essentially an open-flowered form, there is a suggestion in its structure of a tubular flower (campanulate shape). Now the stream which diverged to go north through Basutoland has perhaps the most extreme type of open flower, *A. campanulatus* subsp. *patens*, but on the eastern and northern slopes of the Drakensberg, where their territories abut on one another, there is a range of forms which are rather delicately balanced between the two sub-species.

To the north-east of Natal a floral form appears which seems to derive from *A. campanulatus*. This culminates in *A. caulescens* in northern Natal and Swaziland through the intermediate link of *A. caulescens* subsp. *gracilis* with its reflexed and recurving perianth segments. *A. caulescens* represents, as far as present knowledge exists, the terminal point of distribution of the open flowered type on the eastern side of the continent.

The suggestion of a tubular type of flower first seen in *A. campanulatus* in the south shows a distinct advance in central Natal. In a line from the vicinity of Pietermaritzburg to the slopes of Mont-aux-Sources, a form with a somewhat drooping flower appears (*A. nutans*). This seems to link the open-flowered forms of the south with the tubular ones to the north.

In one remote place in the Eastern Transvaal near Tzaneen, a few isolated plants have been found which are quite distinct from those growing around them. They are short-tubed but the perianth does not spread widely. They are paler in colour too. The likelihood of their having arisen as a mutant is too strong to warrant the assignment of specific rank to them; similarly *A. walshii* of the south-western region occurs in a limited area and may prove to be a mutant arising from *A. africanus*.

The cernuous form as exemplified by *A. nutans* continues to appear with numerous variations, through Natal into Swaziland and on to the borders of Mocambique. In the south-eastern Transvaal it merges into the forms of



FIG. 4. MAP SHOWING DISTRIBUTION OF OPEN-FLOWERED, TUBULAR-FLOWERED AND INTERMEDIATE FORMS

A. inapertus with shorter perianth tubes and more spreading perianth segments. The form with narrow tubular pendent flowers becomes the dominant form from Swaziland northwards. In typical *A. inapertus* the corolla tube is appreciably longer than the free part of the perianth but around a core of this species in the Transvaal, and sometimes penetrating into its domain, there is a fringe of forms with essentially the same habit of growth but with shorter perianth tubes and with their segments spreading to a greater or lesser degree. Those with the tube as long as the free portion of the perianth I have included as sub-species in the species *A. inapertus*.

SEED PRODUCTION

When grown in proximity to each other they hybridize quite freely* but have proved intractable to my attempts to cross them or to obtain seed by self-pollination. Many *Agapanthus* plants in cultivation, since they are more easily cultivated by vegetative means, are derived from the same clone and this seems to tend to self sterility. Similar plants from widely separated localities were crossed with the same poor results. Seed sets freely in the open-flowered forms but less freely in the tubular ones, even when left free for birds, insects and perhaps wind. As soon as inflorescences were covered and pollination effected artificially, only a few, if any, seeds were produced. As far as I know seed is produced copiously by species in their natural habitat. I know this is true for *A. africanus*.

Some cytological work has been carried out by Professor H. P. Riley at the University of Kentucky. The species examined had a chromosome count as follows:—

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>super-numeraries</i>
<i>A. praecox</i> subsp. <i>praecox</i>	6	2	10	8	6 = 30	+ 2B
„ „ <i>orientalis</i>	2	4	8	8	10 = 30	+ 2B
„ „ <i>minimus</i>	6	2	8	8	6 = 30	
„ „ <i>latipetalus</i>	6	5	8	8	2 = 29	
<i>A. campanulatus</i>	.	.	6	2	16 = 30	
<i>A. coddii</i>	2	.	10	4	14 = 30	+ 2B

Chromosomes were measured and classified into the following groups:—

$$a = 9-11.5 \text{ micra}$$

$$b = 8-8.9$$

$$c = 6-7.9$$

$$d = 5-5.9$$

$$e = 3-4.9$$

$$B = \text{supernumerary chromosomes.}$$

* Evidence for this statement is provided by seedlings whose characters are intermediate which appear in gardens and also from reports of seeds which have not come true to the species from which they were collected.

In *A. praecox* subsp. *orientalis* the two supernumeraries are prominent in the emerging radicle but were not observed in root tips that were several days old or in root tips from bulbs; but in *A. coddii* (148/55) they were present in all stages. Riley, H. P. and Debidas Mukenjee, University of Kentucky, Lexington Ky. Chromosomes in *Agapanthus*, Genetics 45 : 1008 (1960).

It is my impression that speciation in *Agapanthus* is not complete, hence the similar forms arising in widely separated localities. These forms seem to be comparatively rare where they occur, e.g. *A. dyeri* from the Blaauberg in the N. W. Transvaal and from Namaachas on the Eastern border and *A. walshii* in the South Western Cape.

I have explored every avenue for characters on which to base the species of *Agapanthus* and have found very few which are reasonably constant. The genus could be broken down into innumerable species or sub-species. The differences between species of *Agapanthus* are very real to the worker in the field and the horticulturist who is growing them. They lie in texture, leaf and flower, in the set of the perianth, obvious in the living plant but lost in the herbarium specimen. For this reason it has been virtually impossible to draw up a key on the older taxonomic basis. As I conceive it, other techniques will have to be employed. Cytology may help to solve the problem, and I put forward my data in the hope that they may be used as a basis for further work.

ACKNOWLEDGMENTS

I acknowledge with gratitude the Smuts Memorial Scholarship which I held in 1953 and 1954. To the Director of the National Botanic Gardens, and to the Curator of the Bolus Herbarium I should like to record my thanks for allowing me facilities to carry out this work. For the loan of specimens I am indebted to the following Herbaria—Kew, National Herbarium Pretoria, South African Museum, Compton Herbarium, Berlin Herbarium and Herbarium Boissier Geneva. For permission to use the coloured plates by Miss W. F. Barker I wish to thank the Royal Horticultural Society of Great Britain. For help and valuable criticism I am grateful to the Hon. Lewis Palmer, an enthusiastic grower of *Agapanthus*. To Dr. G. J. Lewis, who in my absence has seen the manuscript of this paper through the press, I am deeply indebted.

DESCRIPTION OF THE GENUS

AGAPANTHUS

L'Heritier Sert. Angl. 17. (1788); Aiton Hort. Kew. Ed.I. 414 (1789); Willd. Sp. Pl. II. pt. 1. 47. (1799); Red. Lil. I. t. 6. (1802); Roem. et Schultes VII. pt. 2. 997 (1830); Harvey Gen. S.A. Pl. 348 (1830); Endl. Gen. No. 1102 (1836); Benth. & Hook. III. 756 (1883); Bak. in Fl. Cap. VI. 402 (1896); Dalla Torre & Harms Gen. Siphon. 1046 (1900-1907); Fl. Cape Peninsula 169 (1950); Phill. Gen. S.A. Pl. 187 (1951). *Crinum* L. Sp. Pl. 292 (1753). *Albumon* Adanson Fam. II. 54 (1763). *Mauhlia* Dahl Obs. Bot. 25 (1787).

Rootstock tuberous, perennial, giving rise to copious fleshy roots.

Leaves linear, slightly fleshy or sometimes leathery, erect, arcuate or spreading, margins smooth hyaline or ridged, deciduous or evergreen. The leaves arise from shoots on the rootstock which are distinct in the deciduous but less well defined in the evergreen species, in the former the leaf bases are usually thickened to form a bulb-like structure on the rootstock, in the latter old leaf bases form a fibrous coating around the bases of the existing shoots.

*Inflorescence*¹ an umbel with a stout, naked terete or slightly compressed peduncle surmounted by two deciduous spathe valves; pedicels erect, spreading or cernuous with persistent thread-like bracts at their bases.

Perianth somewhat fleshy in texture, blue or white in colour, zygomorphic, segments 6 joined, subequal, the outer face with a median ridge the inner grooved along the same line. This is usually deeper in colour and gives the effect of a stripe on both faces. The three outer segments are usually narrower than the three inner and are often slightly hooded, thickened and uncinatate or bearded at the apex.

Stamens 6, inserted on the tube of the perianth, filaments declinate, of unequal length, anthers dorsifixed, dehiscence introrse. *Ovary* sessile, ovoid or oblong, trilobular with many ovules; style slender declinate, stigma small. *Fruit* a capsule with many flat, black, winged seeds.

KEY TO THE SPECIES

Plants evergreen: leaves not caulescent.

Perianth open.

Perianth less than 5 cm. long.

- | | |
|---|---------------------|
| Perianth thick in texture, deep blue in colour: inflorescence | |
| few—many-flowered but not dense | 1. <i>africanus</i> |
| Perianth thin in texture pale,—medium blue in colour: | |
| inflorescence few—many-flowered or dense | 3. <i>praecox</i> |

¹ The inflorescence appears, except in some few-flowered forms, to be a compound racemose umbel with a central compressed raceme surrounded by a number of similar racemes.

Perianth more than 5 cm. long.							
Inflorescence few—many-flowered	..	..	..	..	..	4.	<i>comptonii</i>
Inflorescence dense	..	..	..	..	..	3.	<i>praecox</i>
Perianth tubular	..	..	..	..	..	2.	<i>walshii</i>
Plants deciduous: leaves caulescent.							
Perianth open.							
Perianth segments spreading at an angle greater than 90°.							
Perianth more than 3·5 cm. long, plants stout	..	..	..	..	..	7.	<i>coddii</i>
Perianth less than 3·5 cm. long, plants slender	..	..	..	..	..	5.	<i>campanulatus</i>
Perianth segments spreading and recurving	..	..	..	..	..	6.	<i>caulescens</i>
Perianth segments spreading but not recurving.							
Pedicels spreading at an angle of 90° or less	..	..	..	..	..	5.	<i>campanulatus</i>
Pedicels cernuous or semi-cernuous.							
Perianth expanding gradually from base to apex	..	..	..	..	..	10.	<i>dyeri</i>
Perianth tube narrow to the throat, segments spreading above	..	..	..	..	..	8.	<i>nutans</i>
Perianth tubular	..	..	..	..	..	9.	<i>inapertus</i>

ALTERNATE KEY TO THE SPECIES

Perianth open, tube less than half the length of the perianth, segments spreading at an angle of 90° or less.							
Perianth deep blue in colour, thick in texture	..	..	..	..	..	1.	<i>africanus</i>
Perianth pale to medium blue in colour, thin in texture.							
Perianth 5 cm. or more in length.							
Peduncle few—many-flowered but not dense	..	..	..	..	..	4.	<i>comptonii</i>
Peduncle densely many-flowered	..	..	..	..	..	3.	<i>praecox</i>
Perianth less than 5 cm. in length	..	..	..	..	..	3.	<i>praecox</i>
Perianth open, tube less than half the length of the perianth, segments spreading at an angle greater than 90°.							
Perianth more than 3·5 cm. long, plants stout	..	..	..	..	..	7.	<i>coddii</i>
Perianth less than 3·5 cm. long, plants slender	..	..	..	..	..	5.	<i>campanulatus</i>
Perianth open, tube half or less than half the length of the perianth, segments spreading and often recurving	..	..	..	..	..	6.	<i>caulescens</i>
Perianth semi-open, tube half or less than half the length of the perianth, segments spreading slightly but not recurving.							
Pedicels spreading	..	..	..	..	..	5.	<i>campanulatus</i>
Pedicels cernuous or semi-cernuous.							
Perianth expanding gradually from base to apex	..	..	..	..	..	10.	<i>dyeri</i>
Perianth tube narrow to the throat, segments spreading above the throat	..	..	..	..	..	8.	<i>nutans</i>
Perianth tubular, segments cohering.							
Inflorescence many-flowered, pedicels cernuous	..	..	..	..	..	9.	<i>inapertus</i>
Inflorescence few-flowered, pedicels spreading	..	..	..	..	..	2.	<i>walshii</i>

The colour system used is Wilson's Horticultural Colour Chart issued by The British Colour Council in collaboration with the Royal Horticultural Society (1938).



PLATE II

By courtesy of the Botanical Research Institute, Pretoria

Type of *Agapanthus africanus* (L.) Hoffmg. in the Linnaeum Herbarium "Polianthes/4 africanum"

DESCRIPTIONS OF THE SPECIES

1. *A. africanus* (L.) Hoffm. Verh. Pfl. 35 (1824); Dur. & Schinz Consp. Flor. Afr. V: 354 (1893); Maytham Kidd, Wild Flowers of Cape Peninsula, Pl. 2. No. 3 (1950); Adamson & Salter, Flora Cape Peninsula 169 (1950); Compton & Rice, Wild Fl. Cape Good Hope, 240 (1951). *Crinum africanum* Linn. Sp. Pl. ed. I, p. 292 (1753). *Tulbaghia Heisteri* Fabric. Enum. Pl. Helmstad (1763). *Mauhlia linearis* Thunb. Nov. Gen. III (1781) and Prod. Pl. Cap. 60 (1794); Thunb. Flor. Cap., ed. Schultes, 308 (1823); *M. africana* Dahl Obs. Bot. Syst. Veg. 26 (1787). *Polyanthes* Miller Gard. Dict. t. 210 (1760). *Agapanthus umbellatus* L'Herit. Sert. Angl. p. 17 (1788); Ait. Hort. Kew. Ed. I, p. 414 (1789); Willd. Sp. Pl. 2. pt. I, 47 (1799); Red. Lil. I, pl. 6 (1802); Roem. et Schult. VII. pt. 2, 997 (1830) partly; Kunth Enum. IV p. 478 (1843) excl. vars. Curt. Bot. Mag. t. 500: Bull. Bot. Soc. Geneve 2nd Ser. Vol. II 1910. p. 194, fig. 10: Marloth Fl. S. Afr. IV, p. 100 (1915); Barclay, Bolus & Steer Book of S.A. Flowers 163 (1925); *A. praecox* Roem. & Schult. VII, pt. 2, 999 (obs. only); *A. minor* Lodd. Bot. Cab. 42 (1817).

Leaves evergreen, 6—18 per shoot, 10—35 cm. long, rarely as much as 50 cm., 8—20 mm. broad, ligulate or falcate, shorter forms stiffly erect, longer flaccid and arcuate, leathery, canaliculate, apices obtuse with an apiculus or subacute, margins hyaline. *Peduncle* 25—70 cm. high, usually 30—50 cm. few- to many-flowered, often purplish and with a waxy bloom; pedicels 1·5—5 cm. long, stiff. *Perianth* thick in texture, deep blue (Lobelia Blue 41/1) rarely paler, 2·5—4 cm. long, tube 0·9—1·4 cm. long; segments spreading from the mouth of the tube, outer oblanceolate to ovate with a marked bearded apiculus, inner obovate, apices obtuse or emarginate. *Stamens* shorter than the perianth, exserted. *Style* finally as long as the stamens. *Capsule* glossy, usually truncate at apex and base but tapering and narrow in some forms.

Flowers December to February.

This is a very variable species and a number of forms sometimes exist side by side. It has not been deemed practicable to subdivide the species. *A. africanus* (L.) Hoffm. has a wide range of distribution from sea-level to 2—3,000 ft. altitude, and from the Cape Peninsula in the west to Riversdale in the east (Drege 8594 Honingklip on the Gouritz River may be *A. africanus*). A white form was shown at a Wild Flower Show in 1920 and was reported by Mr. W. C. West in February 1948 from the summit of Bokkemans Kop, Constantiaberg (Cape Peninsula).

TYPE in the Linnaean Herbarium *Polianthes* 4 *africanum*. Cat. No. 4156.

CAPE PROVINCE. CAPE PENINSULA: Clearing north of Window Stream, Kirstenbosch, Esterhuysen 697, Barker 8022; Table Mt. lower plateau, Esterhuysen 178, Marloth 5785, Galpin 4927; Saddleback, Thode 460, PRE 16757; Devil's Peak, Pappe SAM 23016; Muizenberg, MacOwan 1664; Kalk

Bay Mt., *Wolley* Dod 758; Simonstown, Red Hill, *Salter* 8307; Swartkop, *Pillans* 9527, 9528; Silvermine, *Lewis* SAM 56079; Chapmans Peak, *Linley* SAM 56078; Karbonkelberg, Suther Peak, *Leighton* 9351.

STELLENBOSCH: Jonkershoek, *Rodin* 13262, *Jordaan* 730, *Rycroft* 1517; Banhoek, *Martley* BOL 22380, *Hall* 866; Guardian Peak, *Esterhuysen* 24097.



FIG. 5. 1, 2, 3. *A. africanus* showing variation in floral form.

PAARL: French Hoek Forest area, *Salter* 6550, *Leighton* BOL 25162; Duivels Kloof, *Wasserfall* 735; Roberts Vlei, *Pillans* 6791, *Stokoe* SAM 62641.

CALEDON: Steenbras Kloof, *Esterhuysen* 28686A; Hangklip, *Pillans* 8330; Betty's Bay, *Leighton* 2934, 2935, 2936, 2937; Rooi Els, *Compton* 17537; Kleinmond, *Fuller* 109; Palmiet River Valley, *Leighton* BOL 25161, *Stokoe* SAM 60600; Hermanus, *Leighton* 497, *Jordaan* 786, *Lutjeharms* 6150; Dangar Pt., *Leighton* 1593; River Sonder Einde Mts., *Esterhuysen* 25331.

SWELLENDAM: Plateau E. of 10 O'Clock Peak, *Wurts* 576.

BREDASDORP: Napier, *Jordaan* 6, 785.

WITHOUT PRECISE LOCALITY: *Thunberg* (*Mauhlia linearis* 2) Cap. bon. sp. i. *Thunberg* Herb, Uppsala.

2. *A. walshii* L. Bolus Ann. Bol. Herb. Vol. III p. 14 (1920).

Leaves up to 19 cm. long and 1 cm. broad, not always well developed at the flowering time, linear, acute, subcoriaceous. *Peduncle* 60—70 cm. high, up to 19 flowered, flowers pendulous. *Perianth* 3—5.4 cm. long, tube 1.6—3.9 cm. long, segments spreading slightly towards the apices, outer 0.7—0.8 cm. inner up to 1 cm. broad. *Stamens* finally as long as the perianth.

TYPE *Walsh* in Bolus Herbarium No. 15675.

CAPE PROVINCE. CALEDON: near Steenbras Railway Station alt. 1800 ft., *A. Walsh* BOL 15675; Steenbras, *Linley* SAM 58398.



PLATE III

Type of *Agapanthus praecox* Willd. Supplied by the Berlin Herbarium

This species has only been collected twice and the possibility that it is a mutant cannot be eliminated until more is known about it. In colour and texture the flowers are like *A. africanus* which occurs in the same area.

In attempting to draw up a key to the species, one of my greatest difficulties has been to distinguish between *A. africanus* and *A. praecox* subsp. *minimus*. These forms are territorially distinct and in the living state differ noticeably in colour and texture. *A. africanus* has a thick, almost fleshy perianth of a deep colour while *A. praecox* subsp. *minimus* is almost translucent, pale to medium blue in colour and thin in texture. This same quality of thickness or fleshiness in the perianth is seen again in *A. walshii* occurring in the territory of *A. africanus*, and also in various forms of *A. inapertus* in the Transvaal.

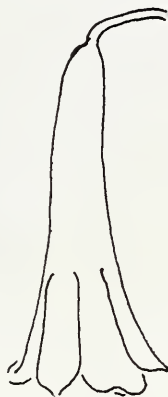


FIG. 6. *A. walshii* L. Bol. from Ann. Bol. Herb. Vol. III pl. 2c

3. *A. praecox* Willd. emend. Leighton, aggregate species.

- (a) subsp. *praecox*
- (b) „ *orientalis*
- (c) „ *minimus*

Plants growing in small isolated groups or in dense clumps. *Leaves* 7—20 per shoot, evergreen, leathery or flaccid, canaliculate, 20—70 cm. long, 1·5—5·5 cm. broad, apices obtuse, subacute or acute. *Inflorescence* few-to many-flowered; peduncle short and slender or tall and stout, 40—100 cm. high; pedicels 4—12 cm. long. *Perianth* 3—7 cm. long, tube 7—26 mm. long, segments spreading to a greater or lesser degree, outer lanceolate 6—8 mm. broad, inner oblanceolate or ovate-lanceolate, often emarginate, 7—12 mm. broad. *Stamens* and *style* exerted, usually as long as the perianth, sometimes shorter.

Flowers December to February.

This species covers an extremely wide range in size, shape and habit. The most divergent could readily be distinguished as separate species but they are linked by so many intermediate forms that it is almost impossible to find characters on which to base a key.

KEY TO THE SUBSPECIES

- Perianth 5 cm. or more in length subsp. *praecox*
 Perianth less than 5 cm. in length
 Inflorescence dense, plants forming dense clumps, peduncle stout,
 usually 60 cm. or more high subsp. *orientalis*.
 Inflorescence few—many flowered, plants smaller and not forming
 dense clumps, peduncle, slender usually less than 60 cm. high . . . subsp. *minimus*.

(a) subsp. *praecox*. *A. praecox* Willd. Enum Hort. Berol. 353 (1809): Roem. et Schultes 7 (ii), 998 (1830) excl. syn. *A. umbellatus* L'Herit. Red. Lil. 7: 403 (1813).

This subspecies is distinguished by the following features:—

Leaves 10—11 per shoot, more or less erect, leathery, usually about 60 cm. long and 3—4 cm. broad, apices subacute. *Inflorescence* many-flowered, peduncle 80—100 cm. high, fairly stout, pedicels spreading, often 10—12 cm.

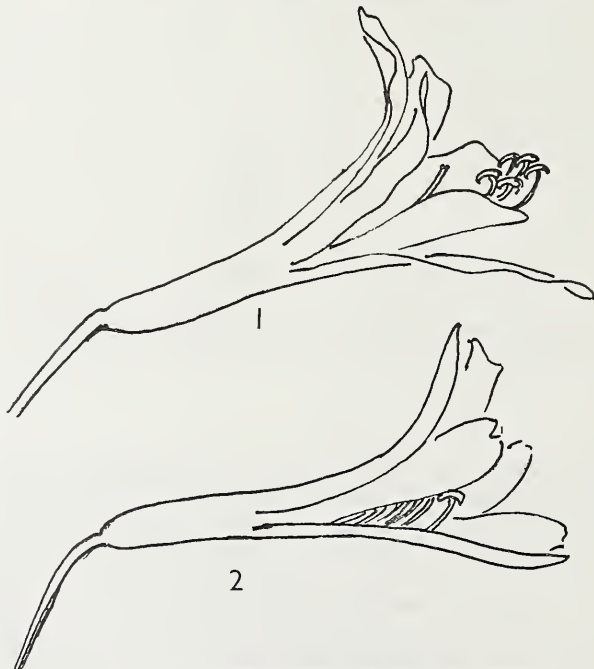


FIG. 7. 1. *A. praecox* Willd. subsp. *praecox* NBG 390/53
 2. *A. praecox* Willd. subsp. *praecox* NBG 1626/32



PLATE 4.

A. praecox Willd. subsp. *orientalis* Leighton.

Magwa Falls, Leighton, NBG 1/53. 1. Inflorescence. 2. Flower—front view. 3. Flower—side view. 4. Young fruit. 5. Young fruit. 6. Leaf tip.

long. *Perianth* Gentian Blue 42/2 to 42/1, 5—7 cm. long, tube 2—2.6 cm. long, segments spreading but not widely, outer lanceolate 7—8 mm. broad, inner oblanceolate, apex obtuse, 9—11 mm. broad.

TYPE. Willdenow 6423 Hort. Bot. Berol, Habitat ad Cap.b.spei. in Berlin Herbarium.

CAPE PROVINCE. UITENHAGE: Cambria Pass, *Compton* NBG 390/53; Longmore Forest Reserve, *Leighton* NBG 1/54; van Stadens Pass, *Holland* NBG 321/54.

HUMANSDORP: Assegaibos, *Leighton* 3101, NBG 21/54; between Assegaibos and Zuurans, *Leighton* 3102, 3100, NBG 24/54; Diep River, *H. Bolus* 2491; between Voëlkraal and Rockdale, *Leighton* 3103.

CATHCART: *Kemp* NBG 124/53.

WITHOUT PRECISE LOCALITY: *Latimer* NBG 1626/32. This is a distinct plant with long flowers which resembles Redoute's figure (Red. Lil. 7. 403). It has not been found in the natural state in the course of this investigation.

(b) subsp. *orientalis* Leighton stat. nov. *A. orientalis* Leighton Journ. S.A. Bot. V. p. 57 (1938): *A. umbellatus* var. *maximus* Edwards Bot. Reg. Vol. 29. 7. (1843): *A. umbellatus* Fl. Pl. S. Afr. Pl. 1. (1921).

This subspecies is distinguished by the following features:—

Plants usually form dense clumps. *Leaves* up to 20 in. each shoot, soft arcuate. *Inflorescence* many-flowered. *Perianth* pale to medium blue, (Lobelia Blue 41 to Gentian Blue 42). There is a white form known only in cultivation, perianth usually 4—4.5 cm. long, segments spreading often crisped on the margins, outer 6—8 mm., inner 9—11 mm. broad.

TYPE. Pillans 7198 in Bolus Herbarium.

CAPE PROVINCE. UMTATA: Port St. Johns, *Pillans* 7198, *Barker* NBG 10/53, *Leighton* NBG 30, 31, 32/53; Mlengana, *Leighton* NBG 23/53.

LUSIKISIKI: Magwa Falls, *Leighton* NBG 1/53.

KENTANI: Kei River Mouth, *Pahl* NBG 5/54; Kentani *Pegler* 629.

KINGWILLIAMSTOWN: Pirie, *Taylor* NBG 243/36; Evelyn Valley, *Leighton* 2658, *Compton* 19241, NBG 8/47; Mt. Coke, *Latimer* NBG 134/45.

VICTORIA EAST: Alice, *Munro* NBG 878/53; Hogsback, *Wilson* NBG 522/53.

CRADOCK: Mortimer, *James* NBG 444/53.

UITENHAGE: Cockscomb Mts., *Esterhuysen* 27091, NBG 108/57.

ALBANY: nr. Collingham Tower, *Leighton* NBG 893/53; Woesthill Rd., *Johnson* 1133, NBG 304/55.

NATAL. PORT SHEPSTONE, *Wright* NBG 558/53; Fasadale, *Watt* NBG 696/54; Ramsgate, *Watt* NBG 697/54.

FORMA

This group is distinguished by its dense inflorescences with very stiff pedicels and shorter, more rigid leaves.

CAPE PROVINCE. CATHCART: Mt. Thomas, *Wilson* NBG 82/55.

VICTORIA EAST: Hogsbach, *Munro* NBG 877/53 (BOL).

TSOLO, *Dyer* 4713, NBG 771/54 (BOL, PRE), *Verdoorn* 8715, NBG 772/54.



FIG. 8. 1. *A. praecox* Willd. subsp. *orientalis* Leighton NBG 5/54
 2. *A. praecox* Willd. subsp. *orientalis* Leighton NBG 696/54
 3. *A. praecox* Willd. subsp. *orientalis* forma α Leighton NBG 82/55
 4. *A. praecox* Willd. subsp. *orientalis* Leighton NBG 134/45

(c) subsp. *minimus* (Lindl.) Leighton stat. nov. *A. umbellatus* L'Herit. var. *minimus* Lindl. in Bot. Reg. t. 699 (1823). *A. longispathus* Leighton in S.A. Gardening Vol. XXIV, p. 82 (1934).

This subspecies differs in that the plants are in general much smaller. The peduncles are more slender and there are fewer flowers in the inflorescence.

Leaves 7—10 per shoot, short, stiff or leathery, not flaccid, often spreading horizontally, 20—30 cm. long, up to 2.5 cm. broad. *Peduncle* slender, stiff, 40—60 cm. high, few—many flowered but never dense. *Perianth* spreading fairly widely, pale blue, 3—4.5 cm. long. The outer segments are appreciably narrower than the inner, outer lanceolate, subacute, 6—7 mm. broad, inner obovate, obtuse or emarginate at the apex, up to 12 mm. broad. *Stamens* shorter than the perianth.

TYPE. Lindley in Bot. Reg. t. 699.

CAPE PROVINCE. KNYSNA: The Heads, *Laughton* B.H. 26231, *Fourcade*



PLATE 5.

A. praecox Willd. subsp. *minimus* (Lindl.) Leighton.
 Storms River, Leighton, NBG 36/54. 1. Inflorescence. 2. Flower—front view. 3. Flower—side view. 4. Young fruit. 5. Inflorescence in bud—front view. 6. Inflorescence in bud—side view. 7. Leaf. 8. Whole plant $\times \frac{1}{4}$.



FIG. 9. 1. *A. praecox* Willd. subsp. *minimus* (Lindley) Leighton NBG 14/54
 2. *A. praecox* Willd. subsp. *minimus* (Lindley) Leighton NBG 148/54
 3. *A. praecox* Willd. subsp. *minimus* (Lindley) Leighton NBG 860/53
 4. *A. praecox* Willd. subsp. *minimus* (Lindley) Leighton NBG 891/53
 5. *A. praecox* Willd. subsp. *minimus* (Lindley) Leighton forma β NBG 71/50
 6. *A. praecox* Willd. subsp. *minimus* (Lindley) Leighton NBG 225/57

2015; Knoetze, Pillans B.H. 26230, Leighton NBG 34/54, Middlemost NBG 10/57; Plettenberg Bay, Esterhuysen 24219; Natures Valley, Leighton NBG 35/54; Groot Rivier, Middlemost NBG 871/52; Storms River Mouth, Kirstenbosch Exped. NBG 1748/50, Leighton 31046, NBG 36/54.

HUMANSDORP: Robhoek, Leighton NBG 19/54; Witte Els Bosch, Leighton NBG 14/54, 15/54, 16/54.

PORT ELIZABETH: Zeyher 1062.

ALEXANDRIA: Whitney, Lewcock NBG 148/54.

BATHURST: Hopewell, Acocks 18368, NBG 635/55.

ALBANY: Mountain Drive, Grahamstown, Leighton NBG 891/53, Johnson 1136, NBG 305/55; Rabbit Bush, Hill NBG 41/53; Howieson Poort, Holland NBG 860/53, Leighton, NBG 890/53.

ADELAIDE: Adelaide, Meyer NBG 178/53.

KINGWILLIAMSTOWN: Yellowwoods Falls, *Confinis* NBG 225/57.

KOMGHA: Kei Mouth, Werner NBG 746A/56.

FORMA

These plants, formerly *A. longispathus* Leighton, are distinguished by the spreading and often recurring segments which are longer and with less marked difference in width between the outer and the inner whorls.

ADELAIDE: Adelaide *N. E. Meyer* NBG 676/28 (type of *A. longispathus* Leighton), *M. Meyer*, NBG 179/53 (BOL, NBG).

A single specimen was found by Mr. H. F. Werner and grown at Kirstenbosch. This has exceptionally broad and widely spreading perianth segments. It may warrant rank as a subspecies or forma if more material becomes available. (Chalumna River, Werner NBG 71/50).

There is a form occurring, as far as I know, only at Fraser Falls in Eastern Pondoland. There is only one collection 5/53. It is deciduous but does not remain dormant—the new set of leaves arises immediately the old ones have been shed. It has a somewhat narrow flower but except in the set of the perianth not easily distinguishable from *A. praecox* subsp. *orientalis*. I cannot make a species of it nor can I put it into *A. praecox* as a subspecies or even a form since it does not conform to the basic character—that of being evergreen. I have indicated it in the diagram because it seems to me to be an important link between the deciduous and the evergreen species.

4. *A. comptonii* Leighton sp. nov., aggregate sp.

(a) subsp. *comptonii*

(b) " *longitubus*

Folia 6—8, erecta vel sub-erecta canaliculata 20—60 cm. longa, 1—2 cm. lata, apicibus subacutis. *Pendunculus* ad 100 cm. altus saepius 60 cm. vel minus pedicellis multis ad 5 cm. longis. *Perianthium* caeruleum, ad 6.5 cm. longum, tubo ad 3 cm. longo; segmenta patentia exteriora ad 1 cm. lata, interiora ad

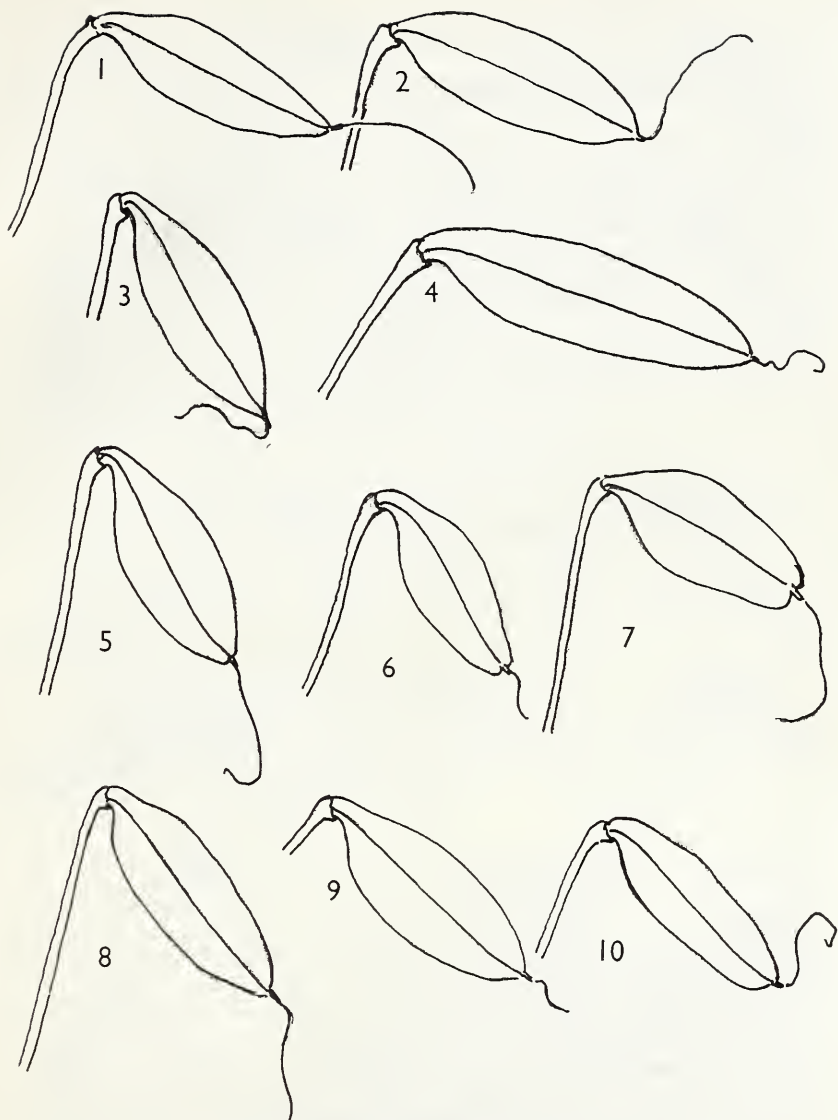


FIG. 10. 1. *A. praecox* Willd. subsp. *orientalis* Leighton forma *a* NBG 82/55
 2. *A. praecox* Willd. subsp. *orientalis* Leighton forma *a* NBG 877/53
 3. *A. praecox* Willd. subsp. *orientalis* Leighton forma *a* NBG 164/56
 4. *A. praecox* Willd. subsp. *orientalis* Leighton forma *a* NBG 134/45
 5. *A. praecox* Willd. subsp. *minimus* (Lindley) Leighton NBG 10/57
 6. *A. praecox* Willd. subsp. *minimus* (Lindley) Leighton NBG 1748/50
 7. *A. praecox* Willd. subsp. *minimus* (Lindley) Leighton NBG 305/55
 8. *A. praecox* Willd. subsp. *minimus* (Lindley) Leighton NBG 635/55
 9. *A. praecox* Willd. subsp. *minimus* (Lindley) Leighton β NBG 71/50
 10. *A. praecox* Willd. subsp. *minimus* (Lindley) Leighton NBG 225/57

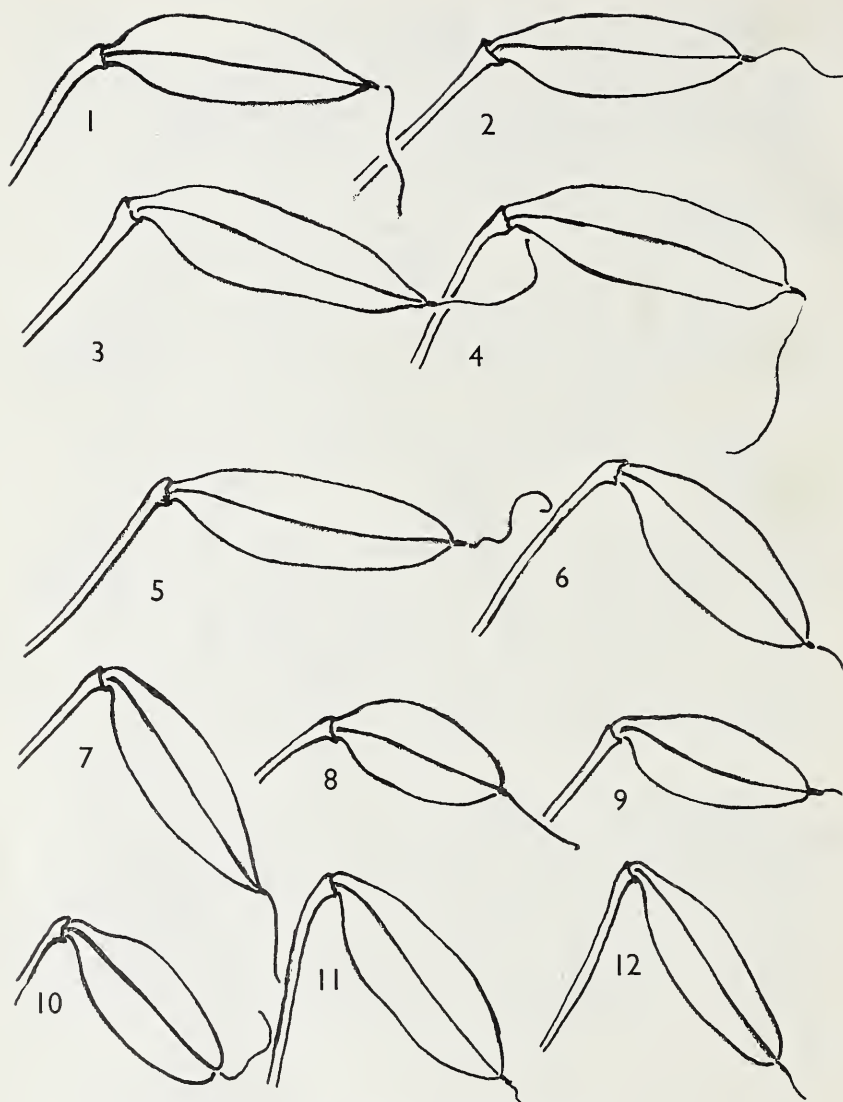


FIG. 11. 1. *A. praecox* Willd. subsp. *praecox* NBG 390/53
 2. *A. praecox* Willd. subsp. *praecox* NBG 23/54
 3. *A. praecox* Willd. subsp. *praecox* NBG 604/58
 4. *A. praecox* Willd. subsp. *praecox* NBG 124/53
 5. *A. praecox* Willd. subsp. *orientalis* Leighton NBG 30/53
 6. *A. praecox* Willd. subsp. *orientalis* Leighton NBG 23/53
 7. *A. praecox* Willd. subsp. *orientalis* Leighton NBG 1/53
 8. *A. praecox* Willd. subsp. *orientalis* Leighton NBG 874/54
 9. *A. praecox* Willd. subsp. *orientalis* Leighton NBG 558/53
 10. *A. praecox* Willd. subsp. *orientalis* Leighton NBG 697/54
 11. *A. praecox* Willd. subsp. *orientalis* Leighton NBG 696/54
 12. *A. praecox* Willd. aff. Leighton NBG 5/53

1·3 cm. lata. *Filamenta* exserta fere stricta, quam perianthium breviora; stylus demum filamentis aequilongus.

Leaves 6—8 per shoot, erect or spreading slightly, bright green, slightly channelled down the face, apices subacute, 20—60 cm. long, 1—2 cm. broad. *Peduncle* glaucous when young, few- many-flowered but never dense; pedicels 3—5 cm. long, erect or spreading. *Perianth* blue varying from Gentian Blue 42/3 with margins and median line 42/2, to Lobelia Blue 41/2 and 41/1, up to 6·5 cm. long, tube up to 3 cm.; segments spreading slightly and recurving at the tips, narrowing appreciably to the junction of the tube, margins often slightly wavy, outer up to 1 cm. broad, apex subacute, inner up to 1·3 cm. broad, apex obtuse or emarginate. *Stamens* almost straight, exserted, shorter than the perianth segments. *Style* finally as long as the stamens.

Flowers February to March. Rarely January.

KEY TO THE SUBSPECIES

Tube one third or less of the perianth length	.. .. .	subsp. <i>comptonii</i>
Tube more than one third and nearly one half the perianth length		subsp. <i>longitubus</i>

(a) subsp. *comptonii*.

This subspecies has a somewhat shorter tube in relation to the total length of the perianth.

Flowers February to March. Rarely January.

TYPE. Compton NBG 397/45 in Bolus Herbarium.

CAPE PROVINCE. BATHURST: Kaffir Drift, *Compton* NBG 397/45. *Compton* NBG 396/45 (pale form).

PEDDIE: Line Drift, *Coffmans* NBG 226/57.

(b) subsp. *longitubus* Leighton subsp. nov.

A typica perianthii tubo longiore differt.

In this subspecies, as the name implies, the perianth tube is proportionally longer in relation to the free portion of the perianth.

I have included in this subspecies a number of forms which are grown in many gardens. This is their closest affinity and I feel confident that sooner or later, in the Albany, Bathurst or East London areas, they will be re-discovered.

In this subspecies too I place a very handsome plant recently introduced to gardens by Gowies of Grahamstown. It was found in the Grahamstown area by one of their staff and also collected and sent to the National Herbarium, Pretoria, by Mr. J. T. Brent of Peddie. It differs in colour and size from the other members of this subspecies, but until further collections are made in the field I prefer to consider it as a form of *A. comptonii* Leighton subsp. *longitubus*. It is of a deep colour ranging between Moorish Blue 739/1 and Lobelia 41.

Flowers January to February.

TYPE: Smith NBG 135/45 in Bolus Herbarium.

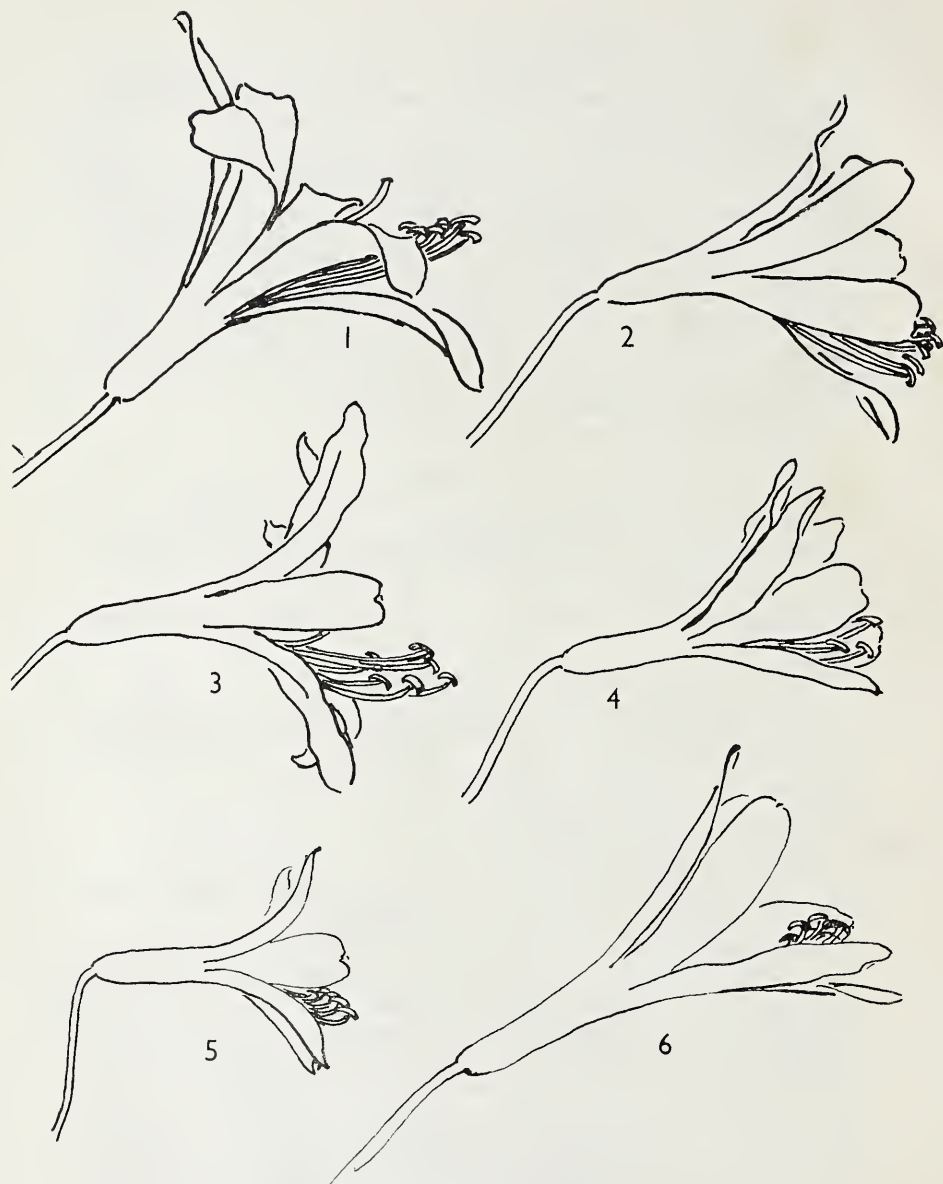


FIG. 12. 1. *A. comptonii* Leighton NBG 397/45
 2. *A. comptonii* Leighton NBG 226/57
 3. *A. comptonii* Leighton subsp. *longitubus* Leighton NBG 135/45
 4. *A. comptonii* Leighton subsp. *longitubus* Leighton NBG 28/56
 5. *A. comptonii* Leighton subsp. *longitubus* Leighton NBG 187/55
 6. *A. comptonii* Leighton subsp. *longitubus* Leighton NBG 215/58



PLATE 6.

A. comptonii Leighton subsp. *comptonii* Leighton.

Kaffir Drift, Compton, NBG 396/45. 1. Inflorescence. 2. Flower—front view. 3. Flower—side view. 4. Young fruits. 5. Inflorescence in bud—front view. 6. Inflorescence in bud—side view. 7. Leaf. 8. Whole plant. (1—7 natural size, 8 $\times \frac{1}{4}$.)

CAPE PROVINCE. EAST LONDON: Chalumna Causeway, *Smith* NBG 135/45. *Gowie* e hort NBG 438/46, 215/58. *Thompson* e hort Mbabane NBG 187/55, *MacIntosh* e hort Hilton Rd. NBG 28/56.

Another form which I regard as belonging to this species or group is one sent in by Miss Lombard from Mortimer in the Cradock District in 1935 (NBG 789/35). This plant still grows at Kirstenbosch and is represented in both the Compton and the Bolus Herbaria, but its exact natural locality can no longer be ascertained.

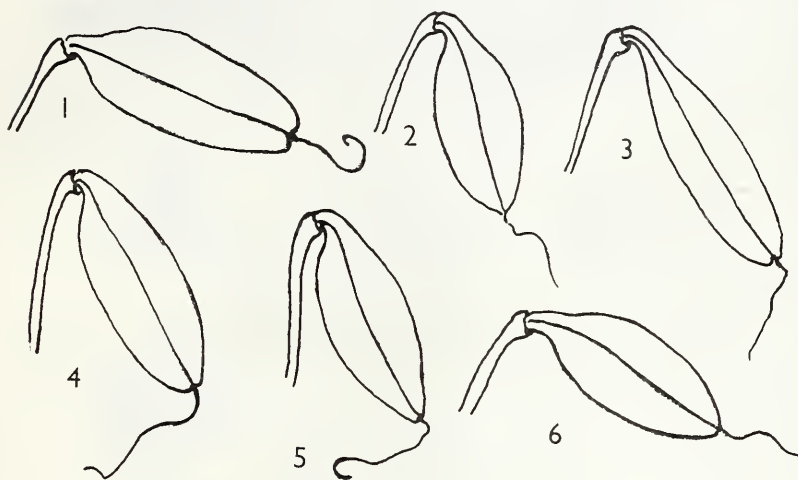


FIG. 13. 1. *A. comptonii* Leighton NBG 397/45
 2. *A. comptonii* Leighton NBG 226/57
 3. *A. comptonii* Leighton subsp. *longitubus* Leighton NBG 135/45
 4. *A. comptonii* Leighton subsp. *longitubus* Leighton NBG 187/55
 5. *A. comptonii* Leighton subsp. *longitubus* Leighton NBG 28/56
 6. *A. comptonii* Leighton subsp. *longitubus* Leighton NBG 215/58

5. *A. campanulatus* Leighton emend. (Aggregate species).

(a) subsp. *campanulatus*

(b) „ *patens*

Leaves deciduous, caulescent 6—12 per shoot, glaucous or glossy, usually narrowing appreciably towards both base and apex, up to 50 cm. usually 15—40 cm. long, 1—2.5 cm. broad, apices acute or subacute rarely obtuse. *Peduncle* 40—70 cm. rarely up to 100 cm. high, few- many-flowered; pedicels spreading 2—7 cm. long. *Perianth* Lobelia Blue to Gentian Blue (pale to deep shades), 2—3.5 cm. long, tube 5—10 mm. long, segments spreading to a greater or lesser degree, apices usually obtuse, exterior 5—8 mm., interior 6—10 mm.

broad. *Stamens* exerted, shorter than the perianth. *Style* and stigma finally as long as the stamens. *Ovary* ovoid.

Flowers December to February.

KEY TO THE SUBSPECIES

Perianth segments spreading widely to 90° from axis	..	..	..	subsp. <i>patens</i>
Perianth segments spreading to ± 45°	..	..	..	subsp. <i>campanulatus</i>

Subsp. **campanulatus**. *A. campanulatus* Leighton S.A. Gardening Vol. XXIV, p.82 (1934).

This is distinguished by having a relatively longer perianth tube and perianth segments spreading less widely.

TYPE: Beghin NBG 404/22 in Bolus Herbarium.

NATAL. RICHMOND: Byrne, *Beghin* NBG 404/22*; Richmond, *Macintosh* NBG 564, 565/53.

UMVOTI: Greytown, *Handley* NBG 162/50, *Galpin* 14840, *Menne* NBG 153/52, *Van Rooyen* NBG 147/52.

NEW HANOVER: Dalton, *Handley* NBG 265/32.

MPENDLE: (I)mpendle, *Gordon Gray* NBG 208/55.

PIETERMARITZBURG: Hardingsdale, *Fairall* NBG 208/55¹; Lidgetton, *Parker* NBG 229/49.

PORT SHEPSTONE: Ramsgate, *Thompson* NBG 682/54.

MTONJANENI: Melmoth, *A. C. L. Schelpe* 261, NBG 233/55.

LIONS RIVER: Nottingham Rd., *Edwards* 1130, *Upton* 7, *Dyer* 4768 A, B and C, *Dyer* B NBG 770/54.

WEENEN: Muden, *Doidge* 11865.

UNDERBERG: Underberg, *Liebenberg* 5468.

NKANDLA: Nkandla, *Codd* 692, NBG 193/55.

HELPMKAAR: Helpmekaar, *Reynolds* 4231, NBG 758/54, *Codd* 6331.

NQUTU: Nqutu, *Codd* 8969, NBG 5/55, *Codd* 6790 A.✓

CAPE PROVINCE. UMTATA: Corana, *Barker* NBG 259/54.

IDUTYWA: Idutywa, *Rayment* in Bolus Herbarium 22898.

TSOLO: Tsolo, *Dyer* 4718.

MATATIELE: Matatiele, *Tyrwhitt Drake* NBG 778/54.

MOUNT CURRIE: Kokstad, *Eliovson* in Bolus Herbarium 25096, NBG 781/54.

WITHOUT LOCALITY: Growing outside House 15, Royal Botanic Gardens, Kew, NBG 68/56.

* The type of *A. campanulatus* had been in cultivation for twelve years when the original description was drawn up. As additional material came in from the field, it was clear that Beghin's plants (NBG 404/22) had become large and gross as compared with the wild specimens. It also became apparent, when collections were made over a wide area in Natal and the Drakensberg Mountains, that *A. campanulatus* and *A. patens* were nothing more than extreme forms of the same species. The two extremes diverge so widely that it was only when confronted by a large number of intermediates, which I could not place with any degree of assurance, that I was forced to accept the fact that both species could not be upheld. *A. campanulatus* has thus been amended to cover *A. patens* as well.

¹ Greatly increased in size in cultivation.



PLATE 7.

A. campanulatus Leighton subsp. *campanulatus*.

Dalton, Handley, NBG 265/32. 1. Inflorescence. 2. Flower—side view. 3. Flower—front view. 4. Young fruits. 5. Inflorescence in bud—side view. 6. Inflorescence in bud—front view. 7. Leaf. 8. Whole plant $\times \frac{1}{4}$.

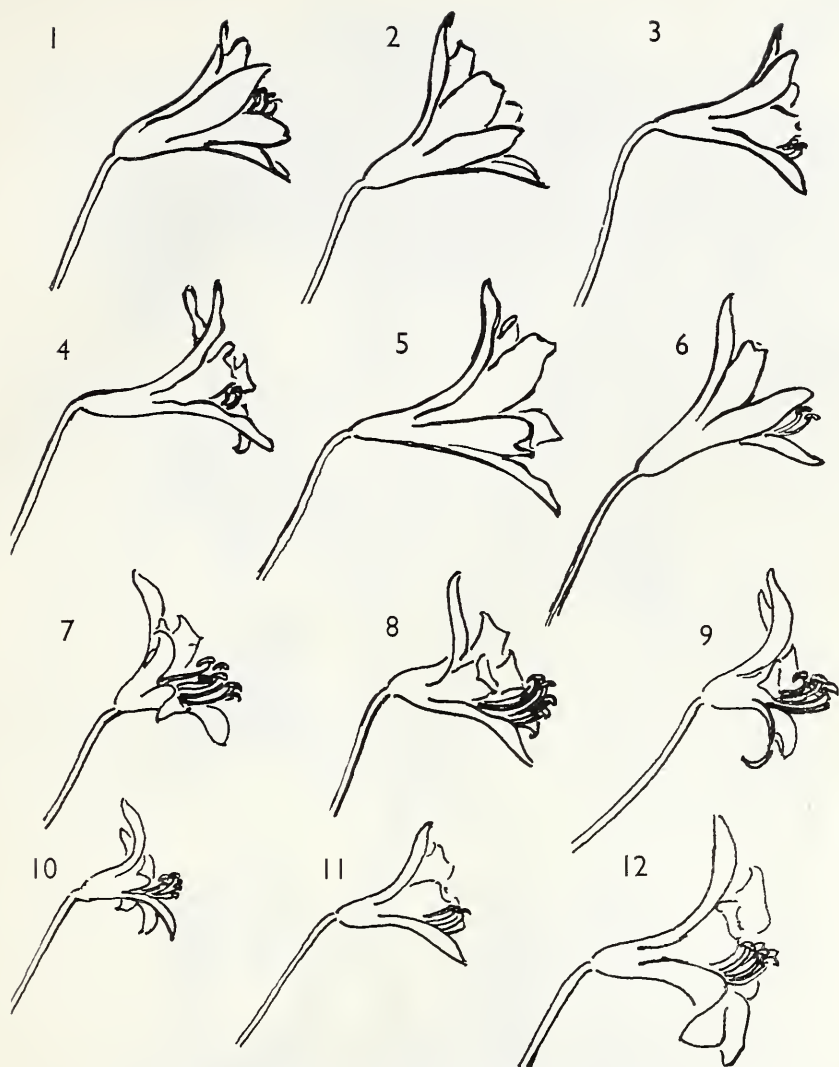


FIG. 14. 1. *A. campanulatus* Leighton subsp. *campanulatus* NBG 404/22
 2. *A. campanulatus* Leighton subsp. *campanulatus* NBG 564/53
 3. *A. campanulatus* Leighton subsp. *campanulatus* NBG 153/52
 4. *A. campanulatus* Leighton subsp. *campanulatus* NBG 144/54
 5. *A. campanulatus* Leighton subsp. *campanulatus* NBG 233/55
 6. *A. campanulatus* Leighton subsp. *campanulatus* NBG 758/54
 7. *A. campanulatus* Leighton subsp. *patens* Leighton NBG 1959/30
 8. *A. campanulatus* Leighton subsp. *patens* Leighton NBG 164/37
 9. *A. campanulatus* Leighton subsp. *patens* Leighton NBG 939/34
 10. *A. campanulatus* Leighton subsp. *campanulatus* NBG 259/54
 11. *A. campanulatus* Leighton subsp. *campanulatus* NBG 68/56
 12. *A. campanulatus* Leighton subsp. *patens* Leighton NBG 2/51

My attempts to obtain living material of this smaller more southerly form of *A. campanulatus*, as exemplified by Barker's specimens from Corana, had come to naught until I found it growing at Kew in 1955. With the help of Mr. Campbell, Curator of the Royal Botanic Gardens, and the records of acquisitions for House 15, it seemed very probable that these plants were the progeny of seeds sent by Canon Mason from Umtata in 1916. These specimens from



FIG. 15. 1. *A. campanulatus* Leighton subsp. *patens* Leighton NBG 66/54
 2. *A. campanulatus* Leighton subsp. *patens* Leighton NBG 322/54
 3. *A. campanulatus* Leighton subsp. *patens* Leighton NBG 752/54
 4. *A. campanulatus* Leighton subsp. *patens* Leighton NBG 654/58
 5. *A. campanulatus* Leighton subsp. *patens* Leighton NBG 2/51
 6. *A. campanulatus* Leighton subsp. *campanulatus* NBG 259/54
 7. *A. campanulatus* Leighton subsp. *campanulatus* NBG 149/52
 8. *A. campanulatus* Leighton subsp. *campanulatus* NBG 162/50
 9. *A. campanulatus* Leighton subsp. *campanulatus* NBG 144/54
 10. *A. campanulatus* Leighton subsp. *campanulatus* NBG 233/55
 11. *A. campanulatus* Leighton subsp. *campanulatus* NBG 758/54



PLATE 8.

A. campanulatus Leighton subsp. *patens* Leighton.

Clocolan, Joubert, NBG 1959/30A. 1. Inflorescence. 2. Flower—front view. 3. Flower—side view. 4. Inner perianth segment. 5. Outer perianth segment. 6. Part of perianth tube with stamens attached. 7. Gynaecium. 8. Inflorescence in bud. 9. Young fruits. 10. Leaf. 11. Whole plant. $\times 4$.

the Transkei and Griqualand East are, on the whole, smaller than those found further north but there is insufficient difference to warrant making them a species or even a subspecies since they merge with the smaller forms which grow in Natal.

Subsp. *patens* Leighton stat. nov. *A. patens* Leighton Journ. S.A. Bot. Vol. XI, p. 99.

Distinguished by the widely spreading or even reflexing perianth segments and the relatively short tube.

TYPE. Joubert NBG 1959/30 in Bolus Herbarium.

ORANGE FREE STATE. CLOCOLAN: Clocolan, Joubert NBG 1959/30.

BETHLEHEM: Bethlehem, Wium NBG 134/53, Potgieter 22, 23, in Nat. Herb. Pretoria, 21932.

FOURIESBURG: Fouriesburg, Caledon Poort, Gemmell NBG 767/54; Wynford, Stokoe 1501.

FICKSBURG: Ficksburg, Hawkes 75, NBG 164/37; Generaals Nek, Steyn NBG 191/53.

HARRISMITH: Harrismith, Putterill 27351, Phillips 3508; Witzieshoek, Junod 17430 in Tvl. Mus. Orange Free State Coll. anno 1862, Thos. Cooper 3270.

BASUTOLAND. Mamathes, Jacot-Guillarmod NBG 767/54, 823/53, 624/53, 6296, 27350 in Nat. Herb. Pretoria; Maluti Mts., Staples 222; Leribe, Dieterlen 385; Thaba Putsoa, Archibald in Bolus Herb. 27093; Mota-pass Coetzee 419.

NATAL. BERGVILLE: Bergville, Gillett 1189; Cathedral Peak, Killick 1249; Rockeries Pass, Esterhuysen 21597, NBG 562/53; Mont-aux-Sources, Dyke Herb. Marloth 5440 (PRE).

MPENDLE: Giants Castle, Symons 14610 in Tvl. Museum (PRE).

ESTCOURT: Winterton, Germishuizen 55; Cathkin Peak, Killick NBG 800/53; Loskop, Holland NBG 322/54; Kamberg, Wright NBG 66/54; Estcourt, Carnegie NBG 939/34.

WEENEN: Umhlumba Mt., Acocks 13990, NBG 752/54.

TRANSVAAL. HEIDELBERG: Suikerbosrand, Johannesburg Parks and Gardens NBG 2/51 (unusually large specimen may have been some years in cultivation). Killick 2720 NBG 654/58; Heidelberg, Leendertz 1065, Transvaal Museum 3738 (PRE), Bonsma, Transvaal Museum 10459 (PRE), Repton 4029; Rosendal, Goossens 1890.

6. *A. caulescens* Sprenger Gartenflora 1901, p. 21. fig. p. 281, emend. Leighton.

(a) subsp. *caulescens*

(b) „ *angustifolius*

(c) „ *gracilis*

Leaves 7—15 per shoot, caulescent, basal sheathing leaves often very short 5—15 cm. long, upper leaves 25—60 cm. long, 1.5 cm. broad, soft bright green, glossy, apices acute to markedly obtuse, margins often hyaline. Peduncle



FIG. 16. 1. *A. caulescens* Spreng. NBG 73/56
 2. *A. caulescens* Spreng. NBG 132/56
 3. *A. caulescens* Spreng. NBG 133/56
 4. *A. caulescens* Spreng. NBG 686/54
 5. *A. caulescens* Spreng. NBG 83/45
 6. *A. caulescens* Spreng. NBG 765/54

60—130 cm. high, densely many-flowered, pedicels spreading and drooping somewhat, 3—7 cm. long. *Perianth* Gentian Blue 42/1 to Lobelia Blue 41/1. 3—5 cm. long, tube 1—1.9 cm. long, segments spreading widely, sometimes recurving. *Stamens* and style shorter than the perianth.

Flowers January to February.

KEY TO THE SUBSPECIES

Leaves narrow (3 cm. or less)	
Leaves flaccid, perianth segments recurving markedly towards the apex	subsp. <i>gracilis</i>
Leaves stiffly erect or nearly so, perianth segments not recurving markedly	subsp. <i>angustifolius</i>
Leaves broad (4 cm. or more)	subsp. <i>caulescens</i>

(a) subsp. *caulescens*

This subspecies is distinguished by its larger flowers and broad leaves, often with obtuse apices. Sprenger's figure of *A. caulescens* is very poor in respect of the inflorescence and flowers but the leafy shoot is easily recognizable. The leaves of a plant grown under glass in Europe seem to be broader and more obtuse than when the same plant is grown out of doors in South Africa—viz. NBG 73/56, which I was given at Kew and which is now well established at Kirstenbosch.

TYPE. Sprenger Garten flora 1901, fig. 281.

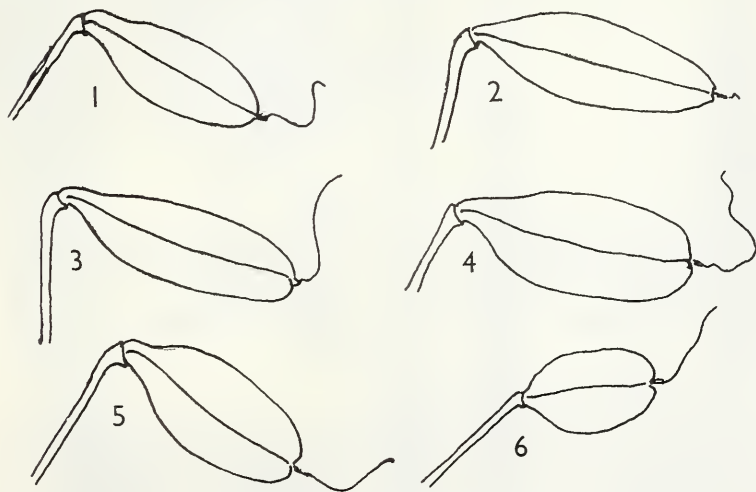


FIG. 17. 1. *A. caulescens* Spreng. NBG 73/56
 2. *A. caulescens* Spreng. NBG 133/56
 3. *A. caulescens* Spreng. NBG 438/48
 4. *A. caulescens* Spreng. NBG 132/56
 5. *A. caulescens* Spreng. NBG 765/54
 6. *A. caulescens* Spreng. NBG 83/45

SWAZILAND. Mbabane, Abner's Farm, *Compton* NBG 132/56; Mbabane, *Compton* 25503 and *Compton* NBG 35/51; Hlotwani Hill, *Compton* 26495; Duikerbush, *Compton* NBG 133/56; Miller's Falls, *Compton* 26543; e hort. Kew 73/56. (This last named plant is thought to be a descendant of Sprenger's plants which came to Kew from Glasnevin).

(b) subsp. **angustifolius** Leighton subsp. nov.

A typica foliis angustioribus apicibus acutis vel subacutis differt.

TYPE. S. Thompson NBG 686/54 in Bolus Herbarium.

SWAZILAND. Forbes Reef, S. Thompson NBG 686/54, *Compton* 28480, 30466. Nr. Mbabane, *Mearns* NBG 515/53 (Flowers white).

NATAL. VRYHEID: Vryheid, *Reynolds* 4318, NBG 83/45.

UTRECHT: Utrecht, *Reynolds* 3982, 3983, NBG 765/54.

TRANSVAAL. WAKKERSTROOM: Wakkerstroom, *van Dam* 24349.

This subspecies differs from the typical form in having narrower leaves with acute or subacute apices. The flowers too are often smaller.

(c) subsp. **gracilis** Leighton stat. nov. *A. gracilis* Leighton Journ. S.A. Bot. XI, p. 101. (1945).



FIG. 18. *A. caulescens* Spreng. subsp. *gracilis*

This subspecies differs from the typical in its more slender, laxer habit, and smaller flowers with perianth segments recurving markedly towards the apices.

TYPE. Gerstner 3189, NBG 186/39, in Bolus Herbarium.

NATAL. UBOMBO: Ubombo—Ingwavuma Range, *Gerstner* 3189, NBG 186/39.

7. *A. coddii* Leighton. sp. nov.

Folia circa 10, caulescentia, erecta vel suberecta, apicibus obtusis vel subacutis, longa 15—45 cm. lata 3—5 cm., basi angustiores. *Pendunculus* alt. ad 100 cm., crassus, pedicellis multis, rigidis 3—6 cm. longis. *Perianthium* 3·5—4 cm. longum, tubo 8—12 mm. longo, segmentis patentibus, apicibus obtusis vel emarginatis, exterioribus 9—11 mm. interioribus 10—13 mm. latis. *Stamina* quam perianthium breviora. *Stylus* deinde stamina aequilongus. *Ovarium* ovatum. *Capsula* ovato-truncata.



PLATE 9.

A. caulescens Spreng. subsp. *gracilis* Leighton.

Ubombo, Gerstner, NBG 186/39. 1. Inflorescence. 2. Flower—front view. 3. Flower—side view. 4. Young fruit. 5. Inflorescence in bud—side view. 6. Inflorescence in bud—front view. 7. Leaf. 8. Whole plant $\times \frac{1}{4}$.

Leaves about 10, markedly caulescent, more or less erect, apices obtuse sometimes subacute, narrowed slightly to the base, 15—45 cm. long, 3—5 cm. broad. Inflorescence fairly dense, peduncle up to 100 cm. high, relatively stout, pedicels stiff, spreading 3—6 cm. long. Perianth Lobelia Blue to Gentian Blue, 3·5—4 cm. long, tube 8—12 mm., segments spreading, usually widely, but never reflexing, apices obtuse often emarginate, outer 9—11 mm. inner 10—13 mm. broad. Stamens and style considerably shorter than the perianth. Ovary short and broad. Capsule ovate, apex truncate.

HOLOTYPE. Erens & Codd 2081 in National Herbarium, Pretoria.

TRANSVAAL. WATERBERG: Kransberg, alt. 4,700 ft., Erens & Codd 2081, Isotype NBG 145/55, 768/54; Kransberg, alt. 6,000 ft., Erens & Codd 6316, NBG 150/55, below the krantzes Erens & Codd 2103 NBG 754/54.



FIG. 19. 1 & 3. *A. coddii* Leighton NBG 145/55 (Codd 2081) Flower and fruit.
2 & 4. *A. coddii* Leighton NBG 754/54 (Codd 2103) Flower and fruit.
5. *A. coddii* Leighton NBG 12/59

This species as a whole is closely related to *A. campanulatus* Leighton subsp. *patens*, but differs in the following respects:—

1. *A. campanulatus* Leighton subsp. *patens* is a small-flowered plant with segments which spread more widely than in *A. coddii*.
2. The perianth tube is relatively longer in *A. coddii*.
3. *A. campanulatus* Leighton subsp. *patens* may sometimes bear tall peduncles but they are never stout nor are the leaves as broad as in *A. coddii*.

Dr. L. E. Codd, Chief of the Botanical Research Institute, has collected *Agapanthus* most assiduously and I am indebted to him for many good specimens and records of locality.

8. *A. nutans* Leighton. sp. nov.

Folia 9—12, caulescentia decidua, disticha, erecta vel suberecta vel arcuata, 20—50 cm. longa, 1—4 cm. lata, apicibus subacutis vel obtusis marginibus hyalinis. *Pedunculus* alt. ad 90 cm. pauci- vel multiflorus, pedicellis patentibus vel cernuis. *Perianthium* 3·5—6 cm. longum, tubo 1·3—2·7 cm. longo, segmentis ad apicem patentibus, lanceolatis vel oblanceolatis exterioribus ad 6 mm. interioribus ad 10 mm. latis. *Filamenta* quam perianthium breviora. *Stylus* demum staminis longior.

Leaves 9—12 per shoot, caulescent, deciduous, distichous, erect, suberect or somewhat arcuate, often glaucous, 20—50 cm. long, 1—4 cm. broad, with hyaline margins and subacute or obtuse apices. *Peduncle* up to 90 cm. high, few to many-flowered, pedicels spreading. *Perianth* Gentian blue 42/2 to Flax blue 642/2, cernuous, 3·5—6 cm. long, tube 1·3—2·7 cm. long, segments spreading towards the apex but never very widely. *Stamens* shorter than the perianth. *Style* and stigma finally almost as long as the perianth.

NATAL. ESTCOURT: Mooi River, *Cheape* NBG 824/53.

PIETERMARITZBURG: Taylor's Halt, *Fairall* NBG 772/39.

BERGVILLE: Mont-aux-Sources, *Holland* NBG 323/54; Maqai Falls, *Killick* 2215, NBG 861/53.

UTRECHT: Utrecht, *Codd* 2515, NBG 773/54.

HLABISA: Hluhluwe, *Ward* 2148.

UBOMBO: Ubombo Mts., Ingwavuma, *Thompson* NBG 685/54.

TRANSVAAL. WATERBERG: Kransberg, *Codd & Dyer* 6312, NBG 149/55, *Codd & Erens* 2079, NBG 757/54, *Codd & Erens* 9148, NBG 147/55.

TYPE. *Cheape* NBG 824/53 in Bolus Herbarium.

FORMA

Leaves up to 6 cm. broad. *Perianth* tube widening perceptibly towards the throat.

TRANSVAAL. LETABA: Ofcolaco "Terrible Hollow", *G. McNeil* NBG 76/56.



PLATE 10.

A. nutans Leighton.

Taylor's Halt, Fairall, NBG 772/39. 1. Inflorescence. 2. Flower—front view. 3. Flower—side view. 4. Young fruits. 5. Inflorescence in bud—side view. 6. Inflorescence in bud—front view. 7. Leaves. 8. Whole plant $\times \frac{1}{8}$.

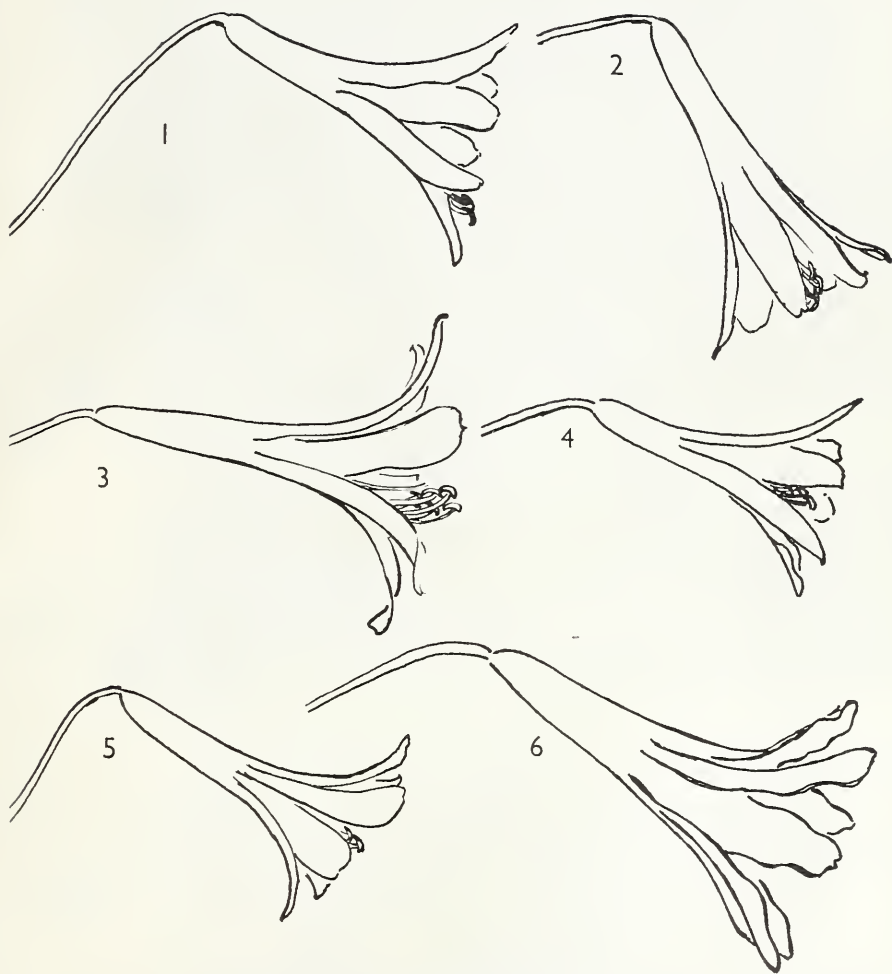


FIG. 20. 1. *A. nutans* Leighton NBG 824/33
 2. *A. nutans* Leighton NBG 772/39
 3. *A. nutans* Leighton NBG 861/53
 4. *A. nutans* Leighton NBG 147/55
 5. *A. nutans* Leighton NBG 684/54
 6. *A. nutans* formaa Leighton NBG 76/56

This plant was sent by Mr. Gordon McNeil from an almost inaccessible ledge on his farm. He had been observing a group of plants for some years, since it differed from *A. inapertus* which is the dominant species in the neighbourhood. I have included this specimen in *A. nutans*, which seems to be its closest affinity. I recognise that since, as far as we know, there is probably only one clone and its derivatives in existence, it is very likely that it may be a mutant.

I am aware that the sporadic occurrence of all those plants I have placed in *A. nutans* may very well mean that they are all mutants which arise from time to time, and I regard this as a grouping of like forms rather than a close-knit species.

A. nutans has links with *A. dyeri* and *A. gracilis*.

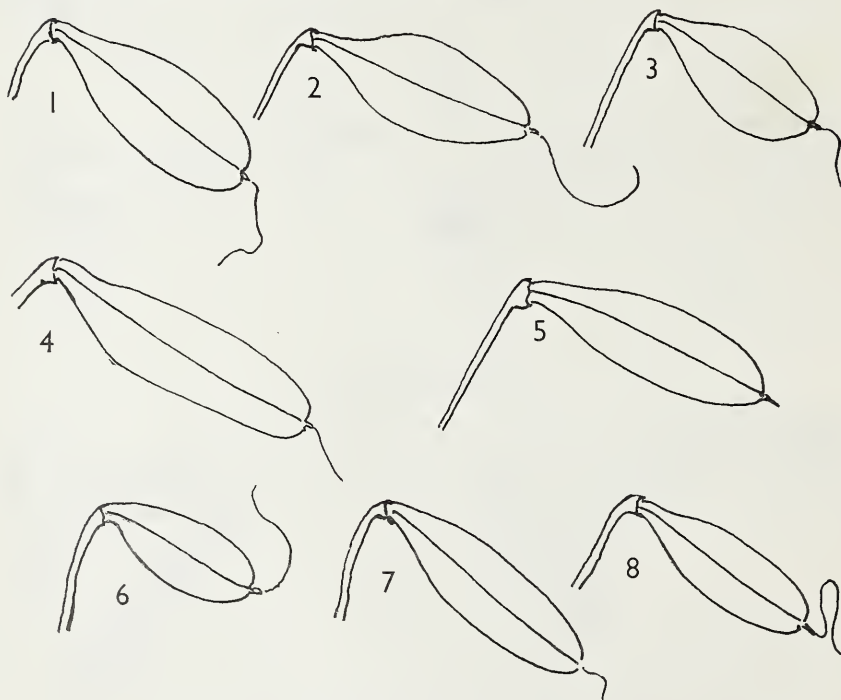


FIG. 21. 1. *A. nutans* Leighton NBG 773/54
 2. *A. nutans* Leighton NBG 824/53
 3. *A. nutans* Leighton NBG 772/39
 4. *A. nutans* Leighton NBG 323/54
 5. *A. nutans* Leighton NBG 861/53
 6. *A. nutans* Leighton NBG 684/54
 7. *A. nutans* Leighton NBG 685/54
 8. *A. nutans* Leighton NBG 147/55

9. *A. inapertus* Beauv. emend. Leighton. Aggregate species.

- (a) subsp. *inapertus*.
- (b) " *pendulus* (L. Bol.) Leighton stat. nov.
- (c) " *hollandii* (Leighton) Leighton stat. nov.
- (d) " *parviflorus*.
- (e) " *intermedius*.

Leaves 6—8 per shoot, caulescent, up to 67 cm. long and 6 cm. broad, usually 30—50 cm. long and 2—3 cm. broad, distichous, often canaliculate, lower leaves often arcuate, upper erect, flaccid or firm, glaucous or glossy, apices acute or subacute. *Peduncle* 30—180 cm. high, rarely less than 60 cm., many-flowered, pedicels 2—5.5 cm. long, erect in bud, spreading and becoming cernuous later. *Perianth* ranging in colour from Aconite Violet 937/3, Victoria Violet 738, Lobelia Blue 41 to Bluebird Blue 042, rarely white, tubular 3—5 cm. long tube, at least half as long as the perianth, segments 3—9 mm. broad, often spreading slightly towards the apices, apices recurved. *Stamens* about as long as the perianth, included or only slightly extruded. *Style* exerted when mature. *Capsule* oblong-elliptic to oblong-ovate.

Flowers January to March.

This description has been amended since Beauverd drew it up on the basis of a single collection made in the Shilovane district in the Eastern Transvaal. It has become abundantly clear, in the course of this investigation, that Beauverd's type represented only one form of a widely distributed aggregate species. For the most part, Beauverd's description holds for the species but the use of the term hypocateriform¹ to describe the shape of the corolla, is borne out neither by the figure which he published nor by an examination of the type.

The salient features of *A. inapertus* Beauv., in spite of diversity in size and form, are:—

1. the cernuous nature of the flowers;
2. the relative length of tube and perianth segment, the tube half to two-thirds of the total length of the perianth;
3. the caulescent, deciduous leaves.

These features must be taken in conjunction—separately they may apply to other species.

The species grows in open grassveld or in forest clearings.

KEY TO THE SUBSPECIES

Perianth segments not spreading appreciably.			
Segments almost as broad as long	..	..	.. subsp. <i>pendulus</i>
Segments narrow	..	..	.. subsp. <i>parviflorus</i>
Perianth segments spreading slightly	..	..	.. subsp. <i>inapertus</i>
Perianth segments spreading perceptibly.			
Segments usually as long as the tube	..	..	.. subsp. <i>intermedius</i>
Segments shorter than the tube	..	..	.. subsp. <i>hollandii</i>

¹ Hypocrateriform = salver shaped, e.g. Primrose, fide B. Daydon Jackson.

(a) subsp. **inapertus**. *A. inapertus* Beauv. Bull. Soc. Bot. Geneve 2nd Ser. Vol. II, 194 (1910).

This subspecies is distinguished by the following features:—

1. the perianth is 4—5 cm. long, the tube more than half as long as the perianth—usually two-thirds;
2. the segments spread only slightly;
3. the stamens are as long as the perianth;
4. the pedicels are 4—5 cm. long.

Colour Lobelia Blue or Bluebird Blue, rarely white.

TYPE. Junod in Herb. Boissier, Geneva.

TRANSVAAL. PIETERSBURG: Shilouwane (Shilovane) *Junod*. The Downs, *Junod* 4123; Woodbush, *Forest Officer*, NBG 350/34, *Taylor*, NBG 1724/35, *Leighton* 3213; Haenertsburg, *Clark*, NBG 717/39, *Thompson* NBG 679/54, *Mogg* PRE 28404, *Codd* 8416, *Pole Evans* 3957; Broederstroom For. Reserve, *Thompson* NBG 679/54, *Leighton* 3211, 3212, 3214.

LETABA: *Thompson* NBG 680/54.

LYDENBURG: Mt. Anderson, *Smuts & Gillett* 2451; Graskop, *Codd* 6452; Kemps Heights, *Codd* 8195, NBG 151/55; between White River and Pretorius Kop, *Thompson* NBG 683/54.

(b) subsp. **pendulus**. *Leighton* stat. nov. *A. pendulus* L. Bol. in Ann. Bol. Herb. III, 80 (1923).

This subspecies is distinguished by its shorter, fleshier perianth, 2·5—4 cm. long. Colour Aconite—Victoria Violet, rarely Lobelia. The segments cohere closely and are relatively broad. Capsule broad and obtuse.

TYPE. Barnett NBG 1056/16 in Bolus Herbarium.

TRANSVAAL. LYDENBURG: *Barnett* NBG 1056/16, *Marais* 37; Graskop, *Reynolds* 4249, 4250 NBG 391/45, *Thompson* NBG 170/55, *Galpin* 13298, *Galpin* NBG 2221/37, *Holland* NBG 552/43.

BELFAST: *Codd* 8264, *Hutchinson* 2768.

DULLSTROOM: *Reynolds* 7216 NBG 262/54; Sabie, *Reynolds* 4248.

(c) subsp. **hollandii** *Leighton* stat. nov. *A. hollandii* *Leighton* in S.A. Gardening Vol. XXIV p. 82 (1934).

This subspecies is distinguished by its narrower perianth segments which spread more widely than those of (a) or (b). Colour—Bluebird Blue ⁰42 to Gentian Blue 42.

TYPE. Holland NBG 173/29 in Bolus Herbarium.

TRANSVAAL. LYDENBURG: Alkmaar, *Holland* NBG 173/29, *Beetge* NBG 461/44; Graskop, *Galpin* 14515, *Codd* 6452; Kowyns Pass, *Thompson* NBG 168/55; Pilgrims Rest, *Reynolds* 4251, NBG 755/54.

(d) subsp. **parviflorus** *Leighton* subsp. nov.

A typica perianthiis brevioribus angustioribus differt.



PLATE 11.

A. inapertus Beauv. subsp. *inapertus*.

Pietersburg, Clarke, NBG 717/39. 1. Inflorescence. 2. Flower—side view. 3. Flower—front view. 4. Young fruit. 5. Inflorescence in bud—front view. 6. Inflorescence in bud—side view. 7. Leaf. 8. Whole plant $\times \frac{1}{2}$.

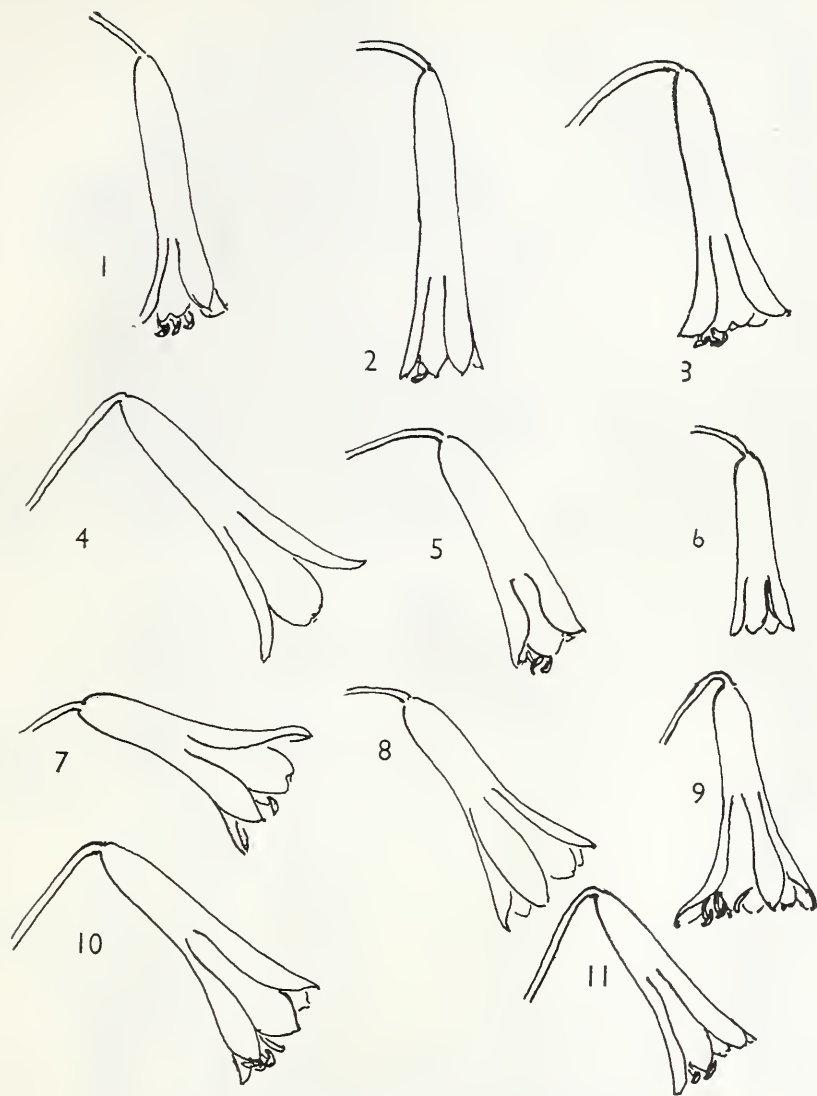


FIG. 22. 1. *A. inapertus* Beauv. subsp. *inapertus* NBG 179/55
 2. *A. inapertus* Beauv. subsp. *inapertus* NBG 683/54
 3. *A. inapertus* Beauv. subsp. *inapertus* NBG 151/55
 4. *A. inapertus* Beauv. subsp. *hollandii* Leighton NBG 173/29
 5. *A. inapertus* Beauv. subsp. *pendulus* (L.Bol.) Leighton NBG 552/43
 6. *A. inapertus* Beauv. subsp. *parviflorus* Leighton NBG 262/54
 7. *A. inapertus* Beauv. subsp. *intermedius* Leighton NBG 260/54
 8. *A. inapertus* Beauv. subsp. *intermedius* Leighton NBG 83/56
 9. *A. inapertus* Beauv. subsp. *intermedius* Leighton NBG 63/57
 10. *A. inapertus* Beauv. subsp. *intermedius* Leighton NBG 192/53
 11. *A. inapertus* Beauv. subsp. *intermedius* Leighton NBG 451/53

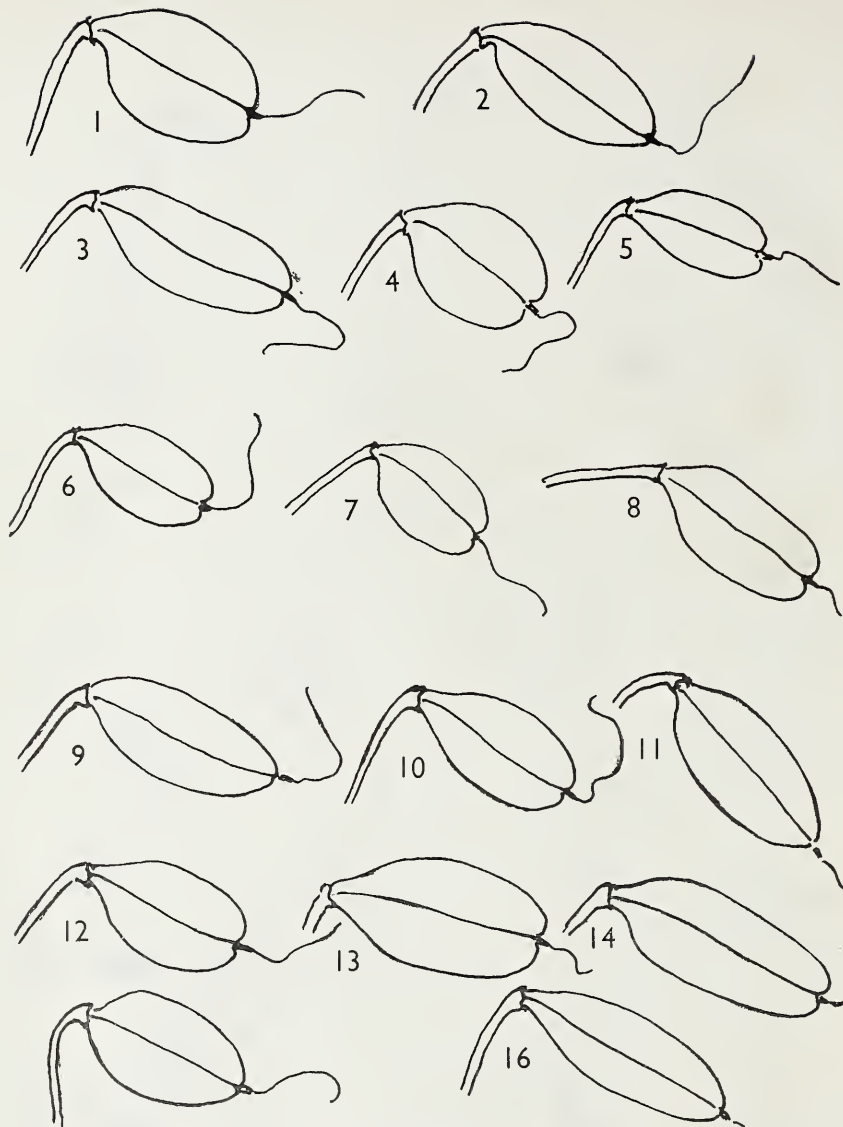


FIG. 23. 1. *A. inapertus* Beauv. subsp. *inapertus* NBG 1724/35
 2. *A. inapertus* Beauv. subsp. *inapertus* NBG 680/54
 3. *A. inapertus* Beauv. subsp. *inapertus* NBG 179/55
 4. *A. inapertus* Beauv. subsp. *pendulus* (L.Bol.) Leighton NBG 552/43
 5. *A. inapertus* Beauv. subsp. *pendulus* (L.Bol.) Leighton NBG 1056/16
 6. *A. inapertus* Beauv. subsp. *hollandii* Leighton NBG 172/55
 7. *A. inapertus* Beauv. subsp. *hollandii* Leighton NBG 461/44*
 8. *A. inapertus* Beauv. subsp. *intermedius* Leighton NBG 260/54
 9. *A. inapertus* Beauv. subsp. *intermedius* Leighton NBG 81/56
 10. *A. inapertus* Beauv. subsp. *intermedius* Leighton NBG 34/51
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 12. *A. inapertus* Beauv. subsp. *intermedius* Leighton NBG 677/54
 13. *A. inapertus* Beauv. subsp. *intermedius* Leighton NBG 192/53
 14. *A. inapertus* Beauv. subsp. *intermedius* Leighton NBG 676/54
 15. *A. inapertus* Beauv. subsp. *intermedius* Leighton NBG 451/53
 16. *A. inapertus* Beauv. subsp. *intermedius* Leighton NBG 769/54



PLATE 12.

A. inapertus Beauv. subsp. *pendulus* (L. Bol.) Leighton.

Graskop, Galpin, NBG 2221/37. 1. Inflorescence. 2. Flower—front view. 3. Flower—side view. 4. Young fruit. 5. Young fruit. 6. Inflorescence in bud—front view. 7. Inflorescence in bud—side view. 8. Leaf. 9. Whole plant $\times \frac{1}{2}$.

This subspecies has relatively small flowers, the perianth varies in length from 2·3—3·5 cm. The segments are narrower and cohere closely.

TYPE. Reynolds 7217, NBG 261/54, in Bolus Herbarium.

TRANSVAAL. LYDENBURG: Dullstroom, *Reynolds* 7217, NBG 261/54, 262/54; Lunsclip Drift, *Leighton* 3274, *Codd* NBG 776/54.

(e) subsp. *intermedius* Leighton subsp. nov.

A typica tubis segmentisque aequilongis vel fere differt.

This subspecies has flowers which range in length from 2·5 cm. to 4·5 cm. and the perianth segments range from those which spread very little to forms in which they spread appreciably. There is also considerable variation in leaf form and in density of flowers in the inflorescence.

The distribution of this subspecies covers the whole territory of *A. inapertus* but it appears to occur mostly on the fringes.

FORMA α

This form has small flowers 2·5—3·5 cm. and the segments do not spread widely.

TYPE. Reynolds 7214, NBG 260/54, in Bolus Herbarium.

TRANSVAAL. STANDERTON: nr. Palmford, *Reynolds* 7214, NBG 260/54.

WAKKERSTROOM: Wakkerstroom, *Reynolds* 1136.

VOLKSRUST: between Paardekop and Sandspruit, *Reynolds* 4228, NBG 763/54.

CAROLINA: near Amsterdam, *Dyer* 3946.

ERMELO: Ermelo, *Leendertz* 7765.

SWAZILAND. MBABANE, *Compton* 247240, NBG 34/51; 5 miles E. of Forbes Reef, *Thompson* NBG 686/54.

FORMA β

The flowers in this group are larger, 4—4·5 cm. long (rarely less) and the segments spread appreciably.

TYPE. *Codd* 9500 in National Herbarium, Pretoria.

TRANSVAAL. CAROLINA: The Brook, *Codd* 9500, NBG 81/56; Oshoek, *Codd* 6394.

BARBERTON: Nelshoogte, *Thompson* NBG 175/55, *Reynolds* 4238, NBG 155/55.

SWAZILAND. Mankiana: *Compton* 27469, *Codd* 6399; Bremersdorp, *van Heerden* NBG, 406/55; MBABANE, Ukatula, *Compton* 25438, 24881, 28519; Polwane Valley, *Compton* 26537; Stroma, *Compton* 25341; Usutu Forests, *Compton* 25464; Forbes Reef, *Compton* 25500, 26517; road to Lochiel, *Thompson* NBG 186/55.

FORMA γ

This form is distinguished by its narrow leaves, few-flowered lax inflorescences and its widely spreading but narrow perianth segments.

TYPE. Reynolds 4243 in Bolus Herbarium.

TRANSVAAL. BARBERTON: Reynolds 4243. ZOUTPANSBERG: Entabeni, Codd 4202, NBG 769/54.

SWAZILAND. MBABANE, Isateki Beacon, Compton 26594, NBG 63/57; Emtembe, Compton 28483.

FORMA δ

These plants are very variable but it has not been found practicable to divide the subspecies further. The perianth usually has the general appearance of a *Cyrtanthus* flower and although the tube is about half the length of the perianth it frequently appears to be less than this since the edges of the perianth segments are free for as much as 3 mm. below the throat of the tube. There is a great deal of divergence in leaf character and in the density of the inflorescence.

TYPE. Maguire NBG 81/56 in Bolus Herbarium.

TRANSVAAL. POTGIETERSRUST: Makapansgat, Maguire NBG 81/56. Maguire 2674.

JOHANNESBURG: Witwatersrand, Linksfield Ridge, Prosser NBG 950/54.

PIETERSBURG: Wolkberg, Leighton 3225, Thompson NBG 677/54; Broederstroom Forest Res., Thompson NBG 164/55.

ZOUTPANSBERG: Louis Trichardt, Mackay NBG 192/53, 142/50, Thompson NBG 676/54; Blouberg, Esterhuysen 21420, NBG 451/53, Codd & Dyer 9200.

BARBERTON: Liebenberg 2369; Havelock Mine, Reynolds 3988; Saddleback, Reynolds 4245; 10 miles S. W. of Barberton (Gibson's Road), Reynolds 2279.

10. *A. dyeri* Leighton sp. nov.

Plantae plerumque 35—40 cm. alt. *Folia* 5—7, long. ad 35 cm. lat. ad 1.5 cm. *Pedunculus* ad 35 fl.; pedicelli adsistentes vel patentes long. ad 3—4.5 cm. *Perianthium* pallide caeruleum, 3.3—3.6 cm. long., tubo 1.3—1.4 cm. longo segmentis leviter patentibus, ovatis vel obovatis ext. 9 mm. lat. int. 10 mm. lat. *Stamina* perianthio aequilonga vel leviter breviora. *Stylus* demum perianthio aequilongus.



FIG. 24. *A. dyeri* Leighton. NBG 242/55

1. Flower
2. Fruit



PLATE XIII

Agapanthus dyeri Leighton. Life size. Photograph of plant cultivated in Pretoria



By courtesy of the Botanical Research Institute, Pretoria

PLATE XIV

Agapanthus dyeri Leighton

Leaves 5—7 per shoot, caulescent, apices subacute, up to 35 cm. long and 1.5 cm. broad. *Peduncle* 35—40 cm. (up to 90 cm. in cultivation), flowers moderately dense about 35 in number; pedicels ascending in bud but spreading and almost cernuous when fully open, 3—4.5 cm. long. *Perianth* Bluebird Blue ⁰42/3 and ⁰42/2, 3.3—3.6 cm. long, tube 1.3—1.4 cm. long; segments spreading but not widely, ovate or obovate, exterior 8—9 mm., interior 10—11 mm. broad. *Stamens* usually as long as the perianth rarely a little shorter. *Style* as long as the perianth when mature.

TYPE. Dyer & Codd 8765 in National Herbarium, Pretoria.

TRANSVAAL. PIETERSBURG: Blaauberg, Mohlakeng Plateau, Dyer & Codd 8765, NBG 873/54.

MOZAMBIQUE. Namaachas, Gomes Pedro 5015, NBG 242/55.

This species is very close to *A. inapertus* subsp. *intermedius*, but the very short tube precludes it from being placed in that species.

It is with pleasure that I associate with this species the name of Dr. R. A. Dyer, former Chief of the Botanical Research Institute, for his services to taxonomy.

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Note: New species have page numbers in bold type. An asterisk indicates that the species is illustrated.

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